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ABSTRACT

Intended to aid nurses in recognizing signs of disease and anomalies in infants, the booklet reviews the major components of appraisal of infants and young children. Attention is given especially to the basic neurological reflex patterns and the maturation of the central nervous system. Criteria for determining whether medical assistance should be sought are given for each aspect of appraisal. Appended are a sample bath technique description, a premature infant checklist, a list of anomalies, and a developmental screening inventory. (KW)

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A DEVELOPMENTAL APPROACH TO CASEFINDING

with special reference to cerebral palsy, mental retardation, and related disorders

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FOREWORD

This booklet is intended as an aid to nurses in recognizing signs of disease and anomalies in infants. The early discharge of infants from hospitals following delivery has greatly increased the responsibility of nurses for casefinding before and after discharge. The increased knowledge that is available about abnormalities and their detection in infants and the more intensive preparation nurses receive today in growth and development can equip them better than ever before to carry out this responsibility.

Una Haynes reviews here many aspects of appraising the infant or young child, with special attention to the basic neurological reflex patterns and the maturation of the central nervous system. Criteria for determining whether an index of suspicion actually exists—whether medical assistance should be sought—are indicated for each segment of appraisal.

Among those who reviewed this guide and made valuable suggestions were practitioners, educators and supervisors in nursing; physicians, including obstetricians, pediatricians, and neurologists; social workers; and physical therapists. The final draft was reviewed and approved by the Committee on the Handicapped Child of the American Academy of Pediatrics.

Although the guide is addressed primarily to nurses, other professionals concerned with the health of infants and children may also find it useful.

ARTHUR J. LESSER
Acting Director,
Maternal and Child Health Service

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GUIDE TO NORMAL MILESTONES OF DEVELOPMENT......................inside back cover

I

INTRODUCTION

DURING THE PAST DECADE, as the number of hospital deliveries per year increased by 37 percent or over 1 million, the average length of hospital stay of the newborn decreased 80 percent (*1*). In a study of 3,247,000 noncesarean deliveries in 1960–61, it was found that 58.1 percent of the mothers (and so nearly the same proportion of the newborn) were discharged within 24 to 48 hours of delivery (*2*).

Early discharge increases the importance of a most careful appraisal of the neonate during the period in which he is in the hospital nursery. Detailed observations of the behavior of normal-term infants in the first 6 hours following birth carried out by Desmond et al. (*3*) have clearly revealed the significant physical reorganization which takes place in the first few hours of life. There is no other period so full of dramatic change, except during catastrophic illness or at the time of death. Therefore, all infants should have careful appraisal and continuous surveillance by the hospital staff, even though the prenatal course and delivery appear to have been entirely within normal limits. Shaffer (*4*) points out that overlooking a cornea which is larger than it should be during the neonatal period may spell the difference between ultimate good vision and blindness. Not noticing, or attaching no significance, to a tiny red spot over the spine may mean that a baby will needlessly suffer one or two bouts of staphylococcal meningitis before his dermal sinus is diagnosed and excised.

Much new knowledge is now available regarding the symptoms which may signal the presence of anomaly, disease or dysfunction, and an increasing spectrum of services is available for patients and their families.

It is axiomatic that the sooner an apparent deviation from the normal is detected, the earlier measures can be taken to arrive at a diagnosis and institute an appropriate program of management. The shortened hospital stay makes it particularly important for the staff to become more expert in recognizing the early and often subtle, as well as the more classic and definitive, signs of anomaly, dysfunction or disease in the infant.

Increased emphasis upon growth and development in programs of nursing education, the expanded role now accorded to nurses and the very nature of nursing services all combine to place the nursing profession in a very strategic position to foster earlier recognition of the infant at risk. For instance, the nurse is the only member of the hospital team who has the opportunity of keeping the newborn under constant surveillance while he remains in the nursery. The nurse's responsibilities are particularly significant along these lines in the large number of hospitals where there is no full-time medical staff to provide a continuum of medical care for newborns. The physician can at best see the child for a short period of time, and it is possible that some unusual sign or symptom may be present at intervals other than during his visit. For instance, a nurse may observe one or more brief episodes of twitching or generalized stiffening of the body accompanied by unusual body positioning. These symptoms may be early signs of brain damage. Certainly, the frequency and character of such manifestations should be carefully observed and precisely described to the physician.

The nurse has another advantage, that of serial observations of the infant in different states—as he is being fed or changed, while he is crying vigorously or sleeping, hungry or content. None of these opportunities should be missed.

Early discharge of infants has also created additional responsibilities for the public health nurse in assisting with earlier recognition of deviations from the normal in growth and development, including signs of illness, anomaly or dysfunction. These responsibilities are more easily recognized in some of the metropolitan communities where heavy pressure on inadequate obstetrical facilities is forcing municipal hospitals to discharge large numbers of patients shortly after delivery (*5*). Day (*6*) illustrates this point quite succinctly in relating the experience of the Brooklyn Visiting Nurse Association, where 4,426 referrals were received in one year for service to mothers and babies who had been discharged from the hospital within 24 to 48 hours of delivery.

While all nursing agencies are not similarly affected, it is important to recognize the potential for early casefinding inherent within the broad scope of services for infants and children being rendered by public health nurses throughout the United States. For instance, in 1963, health department nurses made home visits to 791,263 children under one year of age in rural and suburban as well as metropolitan communities (*7*). These nurses are also in a most fortunate position to detect cases needing medical attention as they observe children at nursing conferences, child health conferences and other clinics.

In some areas of the United States, local customs greatly facilitate early casefinding by public health nurses. For instance, in certain communities all "service" or "ward" maternity cases are referred to official or voluntary public health nursing agencies for followup upon discharge from the hospital. The nurse visits the home, where she tends to the mother's needs, undresses the young infant and observes him carefully, discusses his progress with the parents, records his weight and head circumference, and otherwise arrives at a reasonably complete nursing appraisal of the infant's growth and development. In many cases, because of the extreme youth or inexperience of the mother, the nurse may also find some discreet way in which to determine the grandmother's assessment of the child, since she or some other mature family member may well be the first to identify or express concern about any apparent deviation from the norm. In other regions where cases are not referred routinely to public health nurses, early and periodic appraisal is more difficult to accomplish. However, almost all public health nurses come in contact with infants and young children in the course of their duties, and the resourceful nurse can find a way to appraise a child without causing parental alarm.

While the nurse makes every effort to see that all families retain a physician to provide routine medical supervision for their children, or regularly attend a clinic for this purpose, it is not always easy to achieve these goals, particularly among the less affluent families. While clinic services are available for the medically indigent in most major cities, these facilities may be very crowded. Under these circumstances, a detailed and objective record of nurses' observations of a child's growth and development can be highly useful to the busy physician, who may be expected to see 20 or more children during a relatively short clinic session. Transportation to the clinic poses a problem for some families in many cities, as well as in suburban areas. In rural areas, great distances may be involved and cause serious problems for all concerned in obtaining a medical evaluation of a child. In such situations, the nurse must be particularly astute to avoid over-referral, yet not overlook any potential hazard to the child.

While attention has been directed primarily to the value of careful appraisal during infancy, the need for such surveillance continues throughout the maturation process. Some of the more subtle deviations of congenital origin may escape detection during infancy, coming to light only at a later stage in growth and development. It is also important to remember that cerebral dysfunctions and other deviations which may ultimately handicap a child are not necessarily congenital in origin. They may occur as a result of illness or trauma sustained after birth. "Early" casefinding, in these instances, can refer to a period of convalescence following measles in a school-age child, or the day following the 3-year-old's fall from his swing. Thus the opportunity and responsibility for assisting with detection of deviations from normal patterns of growth and development are shared by nurses who serve older children, that is, nurses in pediatric outpatient or inpatient services, school nurses—in fact, all nurses who have any contact with children.

The potential of the nurse as a scientific observer has been well documented by studies such as those of Lubchenco (*8*), Ott (*9*), Solomons and Hatton (*10*). In none of these studies was there a need for long periods of special training or indoctrination of the professional nurses involved. The nurse should, of course, have a sound knowledge of growth and development; she should be precise in her observations and objective in the recording of data.

This publication has been prepared to assist with earlier recognition of anomalies or dysfunctions. Special attention is given to the incidence of neurological disorders and anomalies in infants and to the factors which help to identify infants at risk. While the importance of maternal aspects is clearly recognized, the focus of this publication is placed upon the vulnerable child, the evolution of basic neurological reflex patterns, and the maturation of the central nervous system. No attempt is made to cover fundamental principles and practices presented in basic texts on growth and development, obstetrics, pediatrics, or public health.

A new device is included (inside back cover) to assist with assessment of the rate at which a child achieves developmental milestones, and criteria indicated as to whether an index of suspicion exists. A special procedure is suggested for assessing the child's stage of development and behavior when circumstances indicate that particular discretion is needed to avoid parental anxiety.

II

PERINATAL MORBIDITY

Risk Factors

On the basis of data from numerous studies (*11–16*), Denhoff and Robinault suggest that it is logical to assume that the same processes responsible for infant mortality give rise, when they occur in lesser degrees, to neurological disorders in surviving children, representing neuromotor, behavioral and receptive dysfunctions (*17*).

In this connection, it is of interest to look briefly at recent mortality trends. The data for 1964 indicate an infant mortality rate of 24.8 per 1,000 live births, the lowest U.S. rate ever recorded. In the past 15 years, however, the rate of decline has lessened significantly, from 4.3 percent per year during 1933–49 to 1.1 percent per year beginning about 1950. And while the death rate in 1964 for white infants was down to 21.6, the rate for nonwhite infants was 41.1, or 90 percent higher. In several of the largest cities, and in rural areas, infant mortality has actually increased. The U.S. death rate is now higher than the rates for the Scandinavian countries, Finland, the Netherlands, Switzerland, United Kingdom, Australia, and New Zealand. Such data bring home sharply the fact that there is much room for improvement in this country of conditions that affect maternal and infant health (*18, 19*).

Anderson (*12*) emphasized the scope of the problem almost two decades ago by reviewing the findings of the U.S. National Office of Vital Statistics for the year 1950. Of the total of 3,622,411 births during that year, it was estimated that reproductive failure accounted for 800,595 impaired infants. Of this number, 57,253 children lived but later represented approximately 21,369 cases of cerebral palsy, 18,110 cases of mental retardation, 7,244 of epilepsy, 5,000 of deafness, 4,708 of cleft palate-cleft lip, and 822 of blindness.

Recent estimates (*20*) indicate that there are approximately 8 to 10 million children and adults in this country who are afflicted by mental retardation, behavioral disorders of organic origin, epilepsy, cerebral palsy, or a combination thereof. Dr. Stewart Clifford of the Harvard School of Medicine, testifying at Congressional hearings in 1961, estimated that 25,500 babies are born each year who will have cerebral palsy or some related disorder of the central nervous system. These data suggest that in the United States one of these babies is born approximately every 21 minutes.

Factors known to contribute to disproportionate perinatal loss and "at risk" status in the infants who survive, as compiled by Oberman (*21*), include:

1. Maternal factors

History of: previously mentally retarded or neurologically handicapped infant, premature birth, repeated miscarriage, cervical incompetence, stillbirth, ectopic pregnancy, abruptio placenta or placenta previa, intrauterine growth retardation, blood group incompatibility, any unexplained fetal or neonatal death.

Genetic disease or chromosomal disorder in relatives or siblings.

Reduced fertility.

Maternal age under 16 or over 36 (primipara) or 40 (multipara); gravida 5 and over.

Maternal height under 5 feet 2 inches, pre-pregnancy weight under 100 pounds; over 20-pound weight gain during pregnancy.

Concurrent maternal medical condition including cardiovascular-renal disease, endocrine disorder, chronic infection, anemia, malnutrition, phlebitis, serious acute infection, urinary tract infection or bacteriuria, condition requiring major surgery.

Dystocia, previous pelvic surgery, abnormality of genital tract including neoplasms and varicosities.

Pregnancy duration under 36 weeks or over 42 weeks.

Excessive exposure to radiation.

Infection during first trimester—rubella, influenza; later infection—toxoplasmosis, syphilis.

Administration of excess amounts of medications or vitamins A or D.

Toxemia of pregnancy—eclampsia and pre-eclampsia.

Threatened abortion, placenta previa or abruptio, any bleeding during the 2nd or 3rd trimester.

Hyperemesis gravidarum.

Multiple pregnancy.

Polyhydramnios or oligohydramnios.

Rising RH antibody titer.

Premature rupture of membranes (12 hours or more prior to delivery).

2. Social and psychological factors

Family income less than $3,000 per year.

Out-of-wedlock pregnancy.

Unwanted pregnancy.

Maternal psychiatric disorder, alcoholism or drug addiction.

Mentally retarded parent; 9th grade education or less.

Previous history of: no prenatal care, late registration for prenatal care, poor clinic attendance, failure to plan for hospitalization.

3. Factors related to labor and delivery

Labor longer than 18 hours in primigravida or longer than 8 hours in multigravida.

Precipitate or uncontrolled delivery.

Uterine inertia or tetany.

Abnormal presentation.

High or mid-forceps; prolonged forceps application.

Version and extraction.

Anesthetic depression.

Cesarean section.

Nuchal or prolapsed cord.

Fetal distress: heart rate sustained at greater than 160/minute or less than 100/minute for 30 seconds; passage of meconium.

Elevated maternal temperature 101.4° and over.

Placental abnormalities.

4. Syndromes in the neonatal period

Birth weight under 2,500 gm. or over 4,000 gm.

Dysmaturity: meconium staining, atrophy of subcutaneous fat.

Hyperbilirubinemia in the first 48 hours of life.

Central nervous system syndrome: persistent hypotonia or hypertonia, opisthotonus, asymmetry of tone, abnormal head size and/or growth, twitching and/or convulsions, weak or shrill cry, reduced movement, staring gaze, excess irritability or lethargy, abnormal reflex response.

Respiratory distress syndrome: grunting respirations, marked retraction, generalized cyanosis, excessive mucus, salivation, drooling, frothing or bubbling.

Gastrointestinal syndrome: poor sucking, gagging, repeated regurgitation, poor weight gain, failure to pass meconium or void within 12–18 hours, abdominal distension.

Infection syndrome: unstable body temperature, persistent elevation of temperature, omphalitis or other nidus of infection; septicemia.

Generalized edema, petechiae, ecchymosis, gross hemorrhage.

Hepatomegaly, splenomegaly.

Major congenital abnormality; three or more minor congenital abnormalities.

Apgar Score of 6 and below.

5. Conditions and syndromes appearing in the post-natal period

Serious illness.

Clinical manifestations of a previously unrecognized major congenital abnormality.

Inattention to sound or visual stimulus.

Delayed or abnormal motor, language, social or adaptive behavior.

Failure to thrive (height and/or weight below the 3rd percentile for age).

Unwanted, abandoned, abused.

Congenital Malformations

A considerable body of knowledge is now being accumulated on the teratogenic effects of radiation, the virus of rubella, the protozoan of toxoplasmosis, folic-acid antagonists, synthetic progestins and other drugs. There is also increased understanding of the interplay between genetic and environmental factors. All of this new knowledge is markedly improving the ability to predict the possibilities of congenital anomaly in future offspring.

Schull (*22*) estimates that approximately one pregnancy in every hundred persisting for 28 weeks or more will terminate in an infant with a major anomaly capable of being diagnosed before the infant is one year of age.

Some of these anomalies will not be immediately evident to the nurse, since they are not detectable by surface observation nor cause any change in vital signs. Some even evade detection by the physician in the neonatal period, since they may be masked by the variations existing within normal development. However, Marden et al. (*23*) in a study of 4,412 newborns report that in 4 percent there were anomalies which could be detected by surface observation alone. These included major defects which could be expected to have adverse effects either on functions or social acceptance, such as cleft lip and palate, hydrocephaly, anencephaly, spina bifida and myelomeningocele.

A single minor anomaly, defined as one with no known medical or cosmetic significance, was found by surface observation in 13.4 percent of these infants, illustrating the relative frequency with which such findings may be expected when infants are carefully appraised. Little diagnostic significance can be attached to detecting a single minor anomaly. However, in studying minor defects in children with selected major defects (i.e., cleft lip and palate, ventricular septal defect, mental retardation) and in a control group, Smith and Bostian (*24*) found that the presence of two minor anomalies in an otherwise normal child is somewhat unusual, and three or more minor anomalies may suggest the possible presence of a major defect. Sometimes the major defect is immediately apparent, such as a cleft lip, but if the major defect involved should prove to be mental retardation or cerebral palsy, the full spectrum of the disorder may not be apparent or recognized until the preschool or school years.

Thus the hospital nurse should inspect the neonate very carefully and record the presence of even minor anomalies, such as skin tags, inner epicanthic folds, clinodactyly or simian crease. Recently other unusual palm lines and digital patterns have been found to have some association with major congenital defects; this may lead to the making of special hand prints of the newborn at the hospital or during followup visits to the home. The public health agency should follow for a longer period any child who has three or more minor anomalies and is not under regular medical supervision, even though no major problem is at first evident. In the course of general health followup for the family of such a child, the nurse should pay particular attention to the total developmental course of the child and note whether he evidences an overall developmental lag of 3 or more months (with corrections for prematurity, if relevant) or other significant deviations in development warranting medical attention.

To indicate the broad range of anomalies which may be encountered by the nurse, some of the major and minor anomalies disclosed by surface examination in the Marden study of 4,412 infants are listed in the appendix.

A long-range study is now underway in the United States which is expected to shed considerable light on the ability to predict the factors which are responsible for reproductive wastage in its broadest sense. The Collaborative Study of Cerebral Palsy and Allied Neurologic Deficits of Infants and Children is sponsored by the National Institute of Neurological Diseases and Blindness and involves detailed multidisciplinary study of 50,000 pregnancies in 15 medical centers, including a 12-year followup program of the infants involved.

These data are expected to provide additional criteria for assisting with prevention and predicting which infants are most apt to need special care both before and after hospital discharge.

III

MAJOR COMPONENTS OF APPRAISAL OF INFANTS AND YOUNG CHILDREN

General State at Time of Observation

André-Thomas and his colleagues (*25*) have called attention to the fact that infants react differently in different circumstances. For instance, the infant who is bombarded with stimuli when he is naked and possibly slightly chilled or insecure during his bath may appear to be quite hypertonic. The same infant may appear much more normal, flexed and relaxed when he is warm and secure in the arms of the nurse. Similarly, being hungry or well-fed will affect the sucking and rooting reflexes. Crying inhibits some reactions. Serial observations are therefore extremely important, as they obviously make possible a finer degree of assessment.

A useful device for recording the state of the infant at the time a particular manifestation is observed, or the varying states in which the observation is repeated, is the following code:

State 1: Eyes closed—regular respiration—no apparent movements

State 2: Eyes opened—regular respiration—no apparent movements

State 3: Eyes opened—no gross movements (child may make some movement of face, trunk or limbs)

State 4: Eyes opened—gross movements—no crying

State 5: Eyes opened or closed—crying

State 6: Other—describe

Some hospitals are already employing a code of this type and others have developed similar criteria for uniform coding of state.

An assessment and description of the state of the infant by the public health nurse in the home at the time an untoward symptom is noted could greatly help the physician in evaluating the nurse's report.

Color and Other Vital Signs

Most nurses are keenly attuned to deviations in color, temperature and respiration. Indications of pallor, cyanosis and jaundice should be given special attention. Plethora, some mottling, or other color change may well be within the normal range, but serial observations of these color changes may provide the physician with information about the baby which could help him detect an otherwise obscure but important underlying difficulty.

Some hospitals are now paying more attention to the type of illumination provided in the nursery in order that the light may be conducive to earlier recognition of deviations in color. Certain electric lights tend to obscure a developing yellow cast or other subtle change. It is therefore helpful to check the child's color by daylight at the nursery window in the course of care during the day.

The possible presence of abrasions or contusions, areas of edema and redness, etc., should also be considered. Some of these findings may occur in infants who have been subjected to a particularly difficult delivery or use of forceps. Petechiae or other evidence of hemorrhage could be due to some inherent blood dyscrasia. However, the possibilities of environmental causes such as lack of appropriate supervision or even willful trauma, that is, child abuse, must not be overlooked, particularly in the appraisal of older infants and children.

Some technical aids which have proved useful in sharpening observations of vital signs include the Vital Sign Wheel, developed at Columbia Presbyterian Medical Center, New York, the Silverman and Anderson Index (*26*), and the Premature Infant Nursery Checklist developed by Lubchenco (*8*) and Ott (*9*) (see appendix). This latter type of record helps to promote regular and thorough observations.

Muscle Tone

The assessment of tone requires considerable experience and judgment. It is not expected that the average nurse would necessarily be able to distinguish subtle variations, but most nurses soon become aware of generalized hypertonicity, the extremely "stiff" infant; or hypotonicity, the very "floppy" child.

André-Thomas and St. Anne Dargassies (*25*) call attention to a factor which they term "consistency"—that component of muscle tone which can be assessed by palpating a muscle and noting the amount of transverse "wobble" which is obtained when the limb is shaken. Since the nurse must handle the newborn with some delicacy, it is doubtful if the factor of consistency will be a major part of her appraisal in the hospital nursery. However, the public health nurse caring for the older baby should remain alert to the amount of "wobble" as she plays with or bathes a youngster, particularly if she has other reasons to suspect that this is an unusually flabby child. Occasionally, a baby who is apparently normal in every other way will be found to be so lacking in tone that his head and trunk must be carefully supported whenever he is moved. His limbs appear to have little or no resistance to passive motion. Sometimes, the phrase "like a little rag doll" is used to describe such a child. It is possible that the child may proceed to a normal course of maturation, but the lack of tone may also be an indication of Down's syndrome (mongolism) or other dysfunction and therefore warrants careful followup. Silver and Gabriel (*27*) have reported findings which suggest that certain mental illnesses, such as childhood schizophrenia, may first signal their presence through generally poor muscle tone as well as persistence of primitive postural responses.

Infants may be found who have such marked extensor tone that they "rear backwards" and stiffen out as the mother or nurse attempts to hold and feed them. In some infants, it may be noted during the bath or diaper change that one or more of the limbs seem to "catch" at the midpoint of flexion and extension, suggesting the possible presence of a hyperactive stretch reflex. Sometimes on internal or external rotation one or more limbs offer resistance, and the child indicates discomfort. These manifestations may be signs of hypertonicity, spasticity, or other deviations, all of which should have medical attention.

Particularly fine illustrations of abnormal tone and posture which may signal the presence of cerebral palsy and related disorders have been provided by Illingworth (*28*).

The ensuing sections are based primarily upon the neurological appraisal of infants as outlined by Paine (*29*). In the discussion of basic reflex patterns, additional suggestions intended to help sharpen surface observations for possible anomaly have been included.

Spontaneous Movements

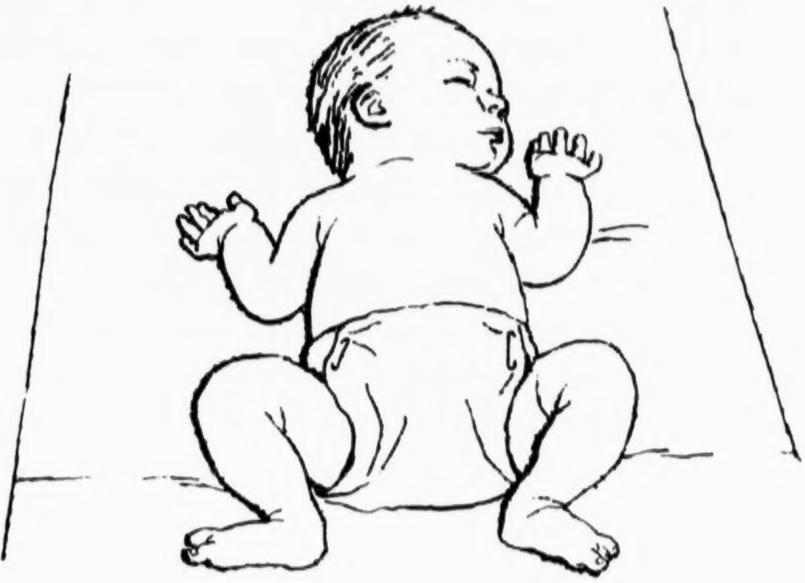
The normal movements of newborns are jerky and usually alternate in the legs but are symmetrical in the arms. They may be jittery or tremulous. The limbs are usually flexed. Premature infants, on the other hand, show greater tendency to extension of their limbs, and their spontaneous movements may be writhing and athetotic.

Possible abnormalities include deviations from these characteristics, asymmetry, or abnormal movements such as myoclonus or convulsions.

Body Posture

The posture of the limbs at rest is also important. The presence of a "pithed frog" position, marked opisthotonos or constantly outflung arms will usually be readily apparent. The asymmetry of brachial palsy may also be quite obvious. Hemiparesis, on the other hand, is rarely apparent in the newborn unless due to a traumatic or hypoxic insult at birth. In cases due to congenital cerebral lesions such as porencephaly, the earliest sign is usually minimal movement of one arm and a greater tendency to keep that hand clenched than the other. In the legs, a greater tendency to external rotation of the hip may sug-

Pithed frog position



gest a possible hip dislocation, a pyramidal tract abnormality or future spastic hemiparesis. Abnormal postures which are apparent for only brief periods may be due to seizures, which are discussed in a later section.

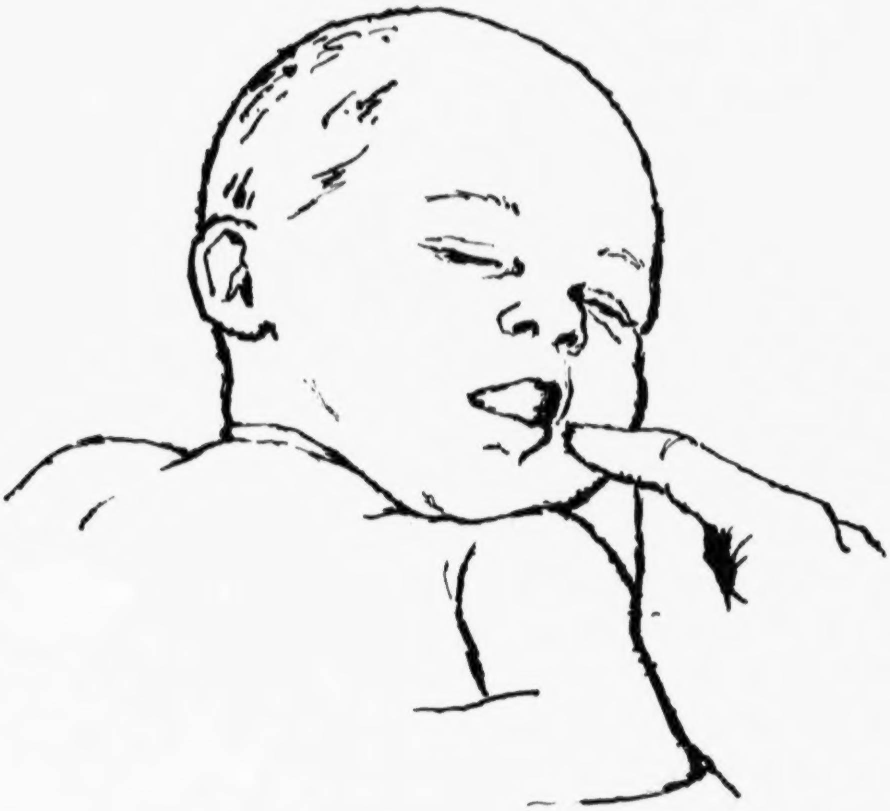
Basic Reflex Patterns

Rooting and sucking

A hungry infant will turn his head to the right or left when his cheek is brushed by the hand or face cloth. When the child is being fed, if the nipple is touched to his face, to the right, left, above, or below his mouth, the lip and tongue tend to follow in that direction.

These rooting and sucking reflexes should be present in all full-term babies. As might be expected, they are more easily elicited before rather

Rooting reflex



than after a feeding. The reflexes may be absent in small prematures. Absence among full-term or older infants suggests depression of the central nervous system from maternal anesthesia, hypoxia or congenital defect.

These responses usually last until 3 or 4 months of age. However, the rooting response may persist during sleep until as late as 7 or 8 months. At later ages, visual stimuli play a part and babies may root for a bottle but not respond to the touch of a finger.

Persistence of the response beyond the 7th month or reappearance later in life warrant thorough medical evaluation.

While rooting and sucking reflexes are being appraised, attention can also be given to the possible presence of anomalies such as a particularly small chin, a face that appears unusually fat in relation to a rather small skull, peculiar dentition such as double-fused teeth, cleft lip or palate, or asymmetry of the nasolabial folds. Excess salivation, mucus, or frothing always warrant attention. Feeding problems are discussed in greater detail below.

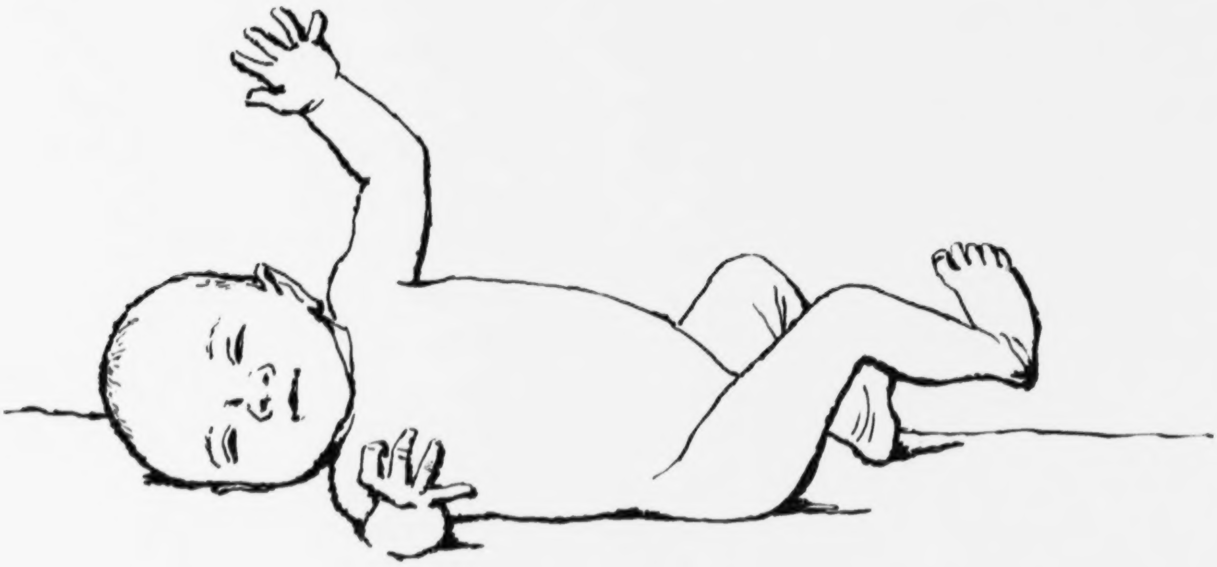
Moro reflex

The Moro reflex, sometimes termed a "startle" reflex, is a series of movements, not all of which may be observed in the individual infant. Moreover, the movement pattern gradually alters with increasing maturity during the first few months of life. It is not possible, therefore, to give a single description which will be applicable at all ages and to all infants. Mitchell (*30*) has described the reflex in the infant a few days old:

"The initial part of the response is extension and abduction of the upper extremities with extension of the spine and retraction of the head. The forearms are supinated and the digits tend to extend and fan out, with the exception of the distal phalanges of the index finger and thumb, which may be C-shaped . . . the upper extremities describe an arc-like movement, bringing the hands towards one another in front of the body, and finally return to the position of flexion and abduction."

Sometimes there may be a slight tremor or even rhythmic shaking of the limbs. The movement of the lower extremities are usually less pronounced. Both tend to extend and abduct with the upper extremities, although there may be a slight movement of flexion first. However, if the lower extremities are extended when the stimulus is applied, the flexion movements may be more readily noted.

A sudden jolting movement, such as that produced by striking the mattress or table on both sides of the infant, will usually cause the startle response. Occasionally a loud noise may precipitate the reflex. Extension of the head relative to the trunk and sudden stimuli appear



Moro reflex

to be the most reliable means of eliciting the Moro reflex.

The Moro reflex is strongest during the first 8 weeks or so of life. Thereafter, it becomes less pronounced. McGraw (*31*) found that most infants changed at about 90 days from the newborn phase to a transitional phase, in which movements become less gross, and at about 130 days to the final "body-jerk" phase. Persistence of the Moro reflex after the 6th month may be considered suspicious and deserves careful medical evaluation.

The Moro response is missing or incomplete in the younger premature but should be readily obtained in any full-term normal baby. Absence of the reflex in the newborn infant may be due to a central nervous system disorder. Occasionally, an infant may display the Moro reflex on the first day, followed by greatly diminished intensity of response during the first few weeks of life because of birth injury or general muscular weakness. It is also possible that cerebral edema or other factors may cause the reflex to be absent on the first day and gradually develop during the following 4 days. In some cases of cerebral hemorrhage, the reflex may be present the first day, disappear and return slowly after the 6th day. These variations reemphasize the value of public health nursing followup of infants who have had early discharge from the hospital after delivery, particularly if they are not under regular medical supervision.

Asymmetry of response may occasionally be noted in normal full-term infants, but any asymmetry suggests the possibility of fracture of the clavicle or humerus, injury to the brachial plexus or neonatal hemiplegia. Paine (*32*) points out that a defective Moro, opisthotonos and the setting-sun sign of the eyes (only upper half of iris showing above the lower lid) are the principal and probably indispensable clinical signs of kernicterus in the first week of life. Whenever such symptoms are noted, the need for medical attention is both immediate and urgent. Paine did not find persistence of the Moro reflex beyond the 6th month in any of the infants in his series who had homologous retardation of psychic and motor development, but abnormal persistence was seen occasionally in the presence of spastic tetraparesis, and in one infant who subsequently developed athetosis.

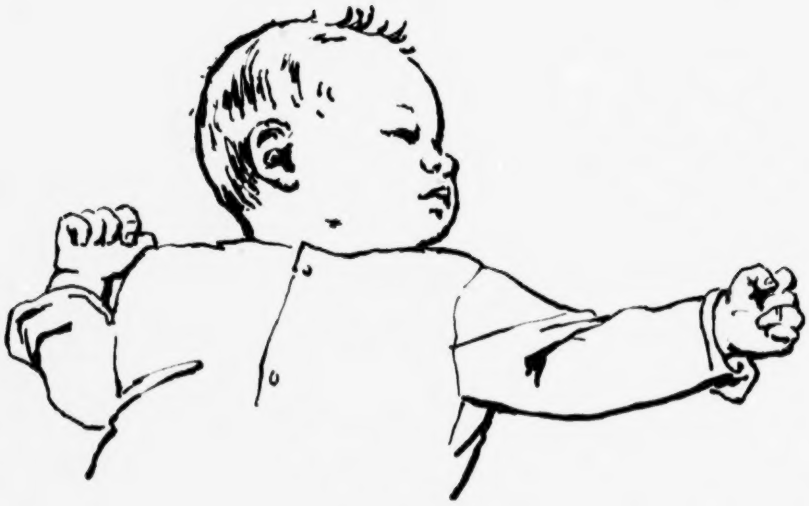
It is not proposed that the nurse undertake special maneuvers for the purpose of eliciting the Moro reflex in the hospital nursery. In the course of routine nursing functions, no matter how gently the infant is handled, it is almost inevitable that the reflex will be elicited several times in any 24-hour period in the nursery, during the appraisal and demonstration bath carried out by the public health nurse, or during the infant's visits to the well-child conference.

If the infant's limbs are free to move, the nurse should be particularly alert for the Moro response when she replaces the infant in the bassinet after changing the crib sheet or as she rolls the bassinet to display the infant to his father at the nursery window. When the infant is returned to the crib, the buttocks might be placed on the crib surface first and the head allowed to extend a little as the infant is lowered onto the mattress. The public health nurse can be particularly alert for the Moro reflex as she places the infant on the bathinette top or on the bath pad on the kitchen table just before or after demonstrating how to bathe the infant.

It is axiomatic that extreme care should be exercised at all times in handling distressed or premature infants, and it can be expected that these babies will receive more constant and consistent medical surveillance. However, the nurse can be particularly alert during the necessary feeding, vital sign check, and other circumstances, wherein the isolette or infant is moved a bit, to detect when and if the Moro appears and the characteristics of the response.

Asymmetrical tonic neck reflex

Papers by Gesell (*33*) and Gesell and Ames (*34*) have described the tonic neck reflex and have stated that it is present in practically all infants during the first 12 weeks of life, often spontaneously manifested by the quiescent baby in the supine position as well as during general postural activity. The asymmetrical tonic neck reflex appears when the infant, lying on its back, turns its head to one side or if the head is passively rotated to one side. The response consists essentially of in-



Asymmetrical tonic neck reflex

creased tone in the extensors of the "chin extremities" and in a decreased tone in the homologous muscles of the occiput extremities. The infant tends to assume a "fencer" position—with his face toward the extended arm, while the other arm flexes at the elbow. The lower limbs respond in a similar manner.

Paine (*29*), Prechtl (*35*), and André-Thomas (*25*), however, have pointed out that there is no constant asymmetrical tonic neck pattern among newborns. The response tends to be most noticeable between 2 and 4 months of age, being replaced by symmetric head and arm positions (when the baby is in supine position) by the time the infant is 5 or 6 months old. Paine (*32*), Prechtl (*35*), Vassella and Karlsson (*36*) agree that while the tonic neck pattern may be partially imposed on a normal infant by passive rotation of the head, this is not a consistent response.

In a study by Paine et al. (*37*) of 66 normal infants during their first year of life, the asymmetrical tonic neck pattern was sustained for more than 30 seconds in a few infants under 3 months of age, but none demonstrated an imposable, sustained response.

The studies indicate that while the asymmetrical tonic neck posture may be apparent from time to time during the first few months of life, persistence of the response after the 7th month constitutes an index of suspicion, and responses which are completely obligatory or unusually strong on one side or the other deserve medical attention at any age.

Since the newborn infant can be expected to need gentle cleansing of his face, neck and area around the ears several times in 24 hours, the nurse is in a fortunate position to watch for the tonic neck response as she rotates the head of the infant in supine, first to cleanse the left side of the face and head, and then the right. An observant nurse can discern whether the TNR is present and whether the response is stronger on one side or the other, compulsory or persistent.

The public health nurse has ample opportunity to carry out similar maneuvers in the course of the demonstration bath. She may then observe for the presence and character of the TNR response without alarming the mother. The resourceful nurse can always find a good excuse to validate or negate her first impression as she replaces the infant in his bassinet, by rotating the head to "smooth out a wrinkle" in the crib sheet—or carefully turning the head to the other side to "brush off a speck" on the sheet.

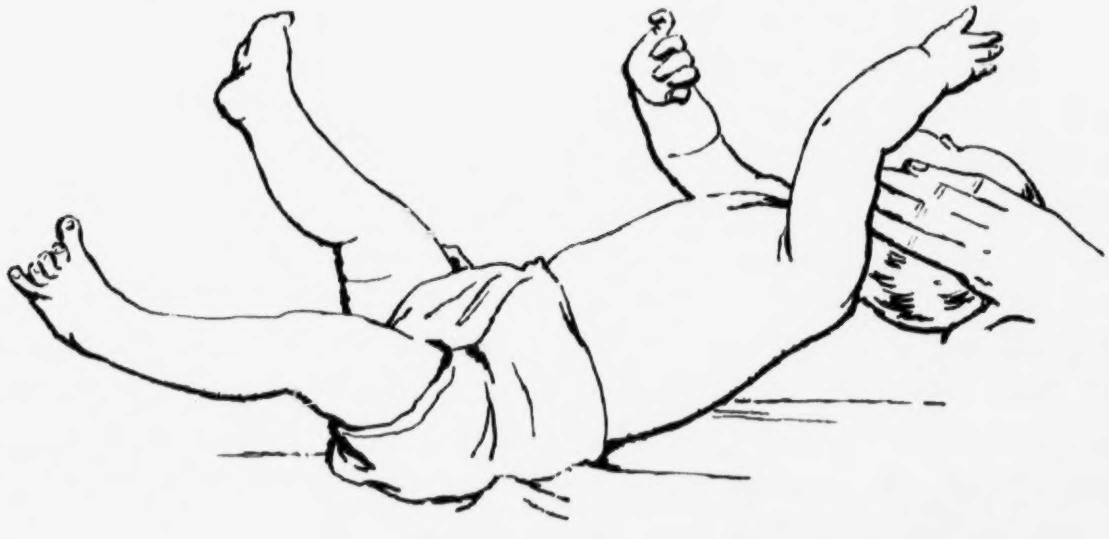
If in serial observations of the infant over 6 months of age the body response seems dependent on the head position, the nurse should ascertain whether or not the reflex has persisted by waving a bright toy first to the right and then to the left of the child, or by finding some little excuse to passively rotate his head.

Observation for the tonic neck reflex pattern of the child provides opportunity for carefully examining the neck to note the possible presence of torticollis or webbing. A particularly short neck in relation to the rest of the body is also worth noting.

Neck-righting reflex

As the asymmetrical tonic neck response is lost, it is replaced with a neck-righting reflex in which passive or active rotation of the head to one side is followed by rotation of the shoulders, trunk and pelvis

Neck-righting reflex



in the same direction. There should be a momentary delay between the head rotation and the following of the shoulders in the true neck-righting response, as opposed to an automatic, sudden and complete body rotation in immediate response to passive turns of the head, which may occur in some abnormal states.

The nurse may observe the two-step righting response in the normal child of 1 or 2 years, as he voluntarily gets up to a sitting position from the supine. First, he turns his head, then the shoulders, trunk and pelvis (before he undertakes the more complicated series of events by which he rolls over, achieves sitting, and/or rising from the floor, in the quadripedal manner).

Paine et al. (*37*) found that the neck-righting reflex was obtainable in all infants by 10 months of age and is gradually covered up by voluntary activity, making the age of its disappearance difficult to define. However, they point out that a neck-righting reflex which is much stronger with the head to one side than to the other is not seen in normal infants; nor should the response at any age be so completely invariable that the baby could be rolled over and over. Stereotyped reflexes of this type are considered pathologic and often found in infants with cerebral palsy.

Posture in Ventral Suspension and the Landau Reflex

All normal neonates display some evidence of tone when suspended in the prone position. The nurse may observe this when the baby is turned to prone during the nursery admission cleansing procedure. The public health nurse may assess tone as she weighs and measures the baby at well-child conferences, takes his rectal temperature, or while bathing the child at home. As the newborn infant is turned to prone, with his trunk or abdomen supported, his legs should be flexed. While his head may sag below the horizontal and the spine may be slightly convex, he should not be completely limp and collapse into an inverted U.

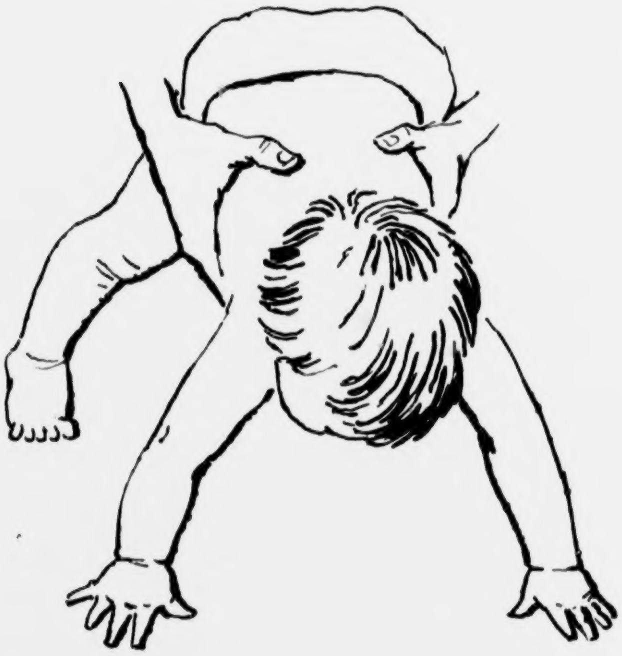
As he becomes a little older, the head and spine are maintained in a more nearly horizontal plane. There is a gradual increase in the tendency to elevate the head as if to look up while the spine remains straight, followed by elevation of the head well above the horizontal and arching of the spine in a concave position. Paine et al. (*37*) found that the head was above the horizontal in 55 percent of their series at 4 months and in 95 percent at 6 months. The spine remained at least slightly concave in approximately half of the 8-month-olds but concavity was noted universally at 10 months. As a rule, the Landau reflex is designated as "positive" when the infant reaches this latter stage, that is, head up, back arched a bit in ventral suspension.

Dissolution of the reflex is difficult to ascertain since it is gradually covered up by struggling or other voluntary activity. At any age, the limp collapse into the inverted **U** should be called to medical attention.

Parachute reflex

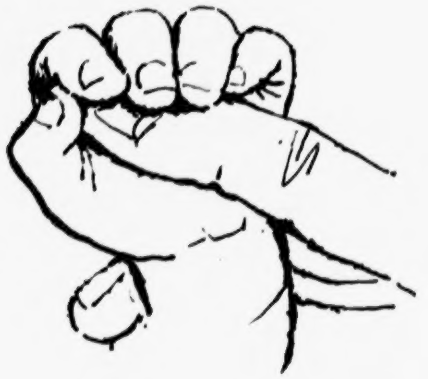
The parachute response consists of extending the arms over the head and out—as if to break a fall—when the infant is suspended and then plunged downwards and sidewards toward a table top. The extension of the different segments, fingers included, occurs before contact is made.

Parachute reflex

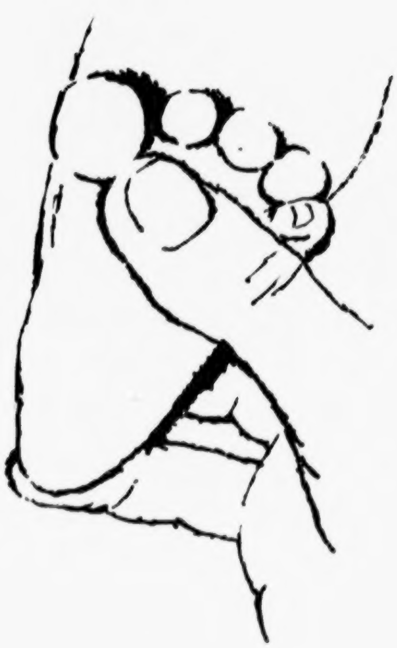


Partial response may be noted as early as 3 months. The complete response begins a little later, and will be noted in most infants at 9 months and in all normal infants at 12 months (*37*). An asymmetrical or absent response warrants medical appraisal.

Public health nurses are alerted to watch fathers at play with their children, as the game of "so high" or "airplane" may provide the opportunities to observe for the presence and character of the parachute reflex, as well as extensor tone in ventral suspension. Nurses who have developed a warm rapport with the child and family may also play with the infant in this fashion, since most infants respond with great glee.



Palmar grasp



Plantar grasp

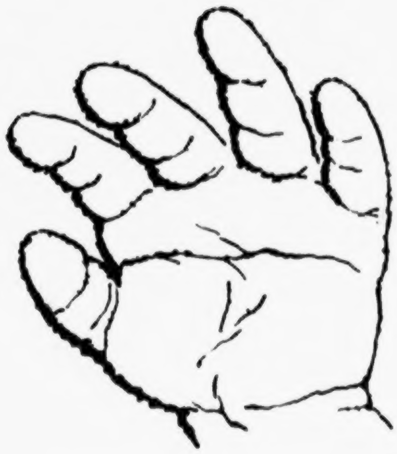
Palmar and plantar grasp

Palmar and plantar grasp are automatic reflexes of full-term newborns and are elicited by placing the observer's finger firmly in the palm or at the base of the child's toes. Both are strong. The palmar grasp response weakens as the hand becomes less continuously fisted, merging into voluntary ability to release an object held in the hand sometime after 2 months. The plantar response disappears at about 8 or 9 months, though it may persist during sleep for a while thereafter. Possible abnormality may be suspected in asymmetry of response. While there is a tendency to fisting in the neonate, this should not be evident at all times. Serial observation of infants in the nursery should reveal relaxation of both hands at some point, usually during or right after a feeding, or perhaps when asleep. These appraisals provide additional opportunities for detecting abnormalities of color such as cyanosis of the extremities, edema, simian palm crease (a straight line rather than an M-shape across the palm), and possible malformations of the hands and feet. Persistent edema of the feet is always worth noting, particularly if occurring in a female child, as it may signal the presence of a chromosomal abnormality (X. O. Turner's syndrome).

Hand functions

It is usually stated, as a rough guide, that the baby can be expected to reach and grasp with the whole hand at 4 or 5 months, to grasp with thumb and two fingers at 7 months, and to pick up small objects with thumb and forefinger at 9 months. Paine (*37*) and his colleagues found that the pincer grasp with thumb and forefinger was obtainable in 52 percent of their series at 8 months and was not universally present until 12 months.

Any unusual use, disuse or peculiar hand positions, such as a tendency to ulnar deviation, athetosis, consistent avoiding reflexes, or a developmental lag of 3 months in attaining pincer grasp deserve medical appraisal.



Simian palm crease

Traction response

Physicians test the traction response by placing the infant in supine, then drawing him up to sitting position by the hands. Normally, assistance by the shoulder muscles can be felt and seen. The newborn's head lags behind and drops forward suddenly when the upright posture is reached. Even in the newborn period, however, there should be sufficient head control to bring it back upright, and greater control is expected with age. The nurse in testing the neonate may gently lift the infant to note the presence, absence, or asymmetry of response, but should avoid reaching the midline point, causing the head to drop forward suddenly.

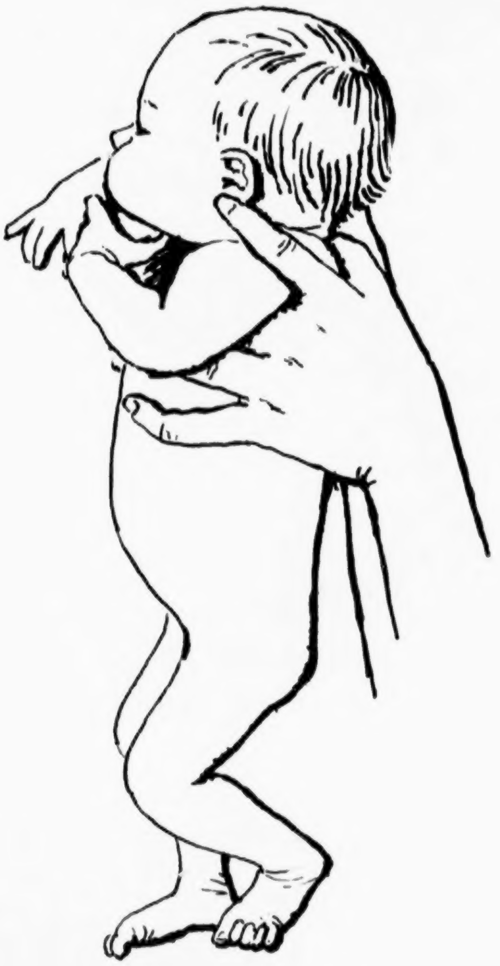
The response is asymmetrical in brachial palsy or hemiparesis. It may be absent in hypotonic states, including spinal muscular atrophy and general nervous system depression. It may be strikingly so in Down's syndrome (mongolism).

Supporting reaction

The supporting reaction is elicited by supporting the infant vertically and allowing his feet to make firm contact with the table top or other firm surface. All student nurses will at some time have seen a physician examine a neonate in this fashion and noted the "standing" posture, which includes some flexion of the hip and knee. Automatic stepping may also be observed when the newborn is inclined forward while being supported in this position. During the first 4 months of life, the crouching position gradually diminishes; this is followed by increase in support, so that all normal infants will usually support a substantial proportion of their weight by 10 months (*37*).

It may be expected that a few infants will stand on the toes from time to time, and others will occasionally cross or "scissor" the legs. However, consistent standing on the tip of the toes or scissoring after 4 months may be considered an index of suspicion warranting medical attention. A club foot or a deformity at the knee or hip may also become apparent while the supporting reaction is being appraised.

After the infant is 6 months of age, the supporting reaction becomes less clearly demonstrable, and by the age of 10 or 11 months, it is difficult to distinguish from voluntary standing.



Supporting reaction and stepping

Later Stages in Neurological Maturation

Sitting

The ages at which the infant sits with some support, sits alone, stands and walks correlate to a considerable degree with the ages at which changes take place in postural reflexes. Sitting usually takes place at about 6 or 7 months, with inability to sit unsupported after the age of 9 months constituting an index of suspicion.

One useful criterion for judging whether or not a child is truly "sitting without support" is to note whether he can sit with a fairly straight back and turn his head or rotate the body without losing his balance. Another useful test is to play with the child at some time when he is happy, comfortable, and sitting on a hard surface. When he is given a little push to the right or left, it should be noted whether or not he "instinctively" reaches out on either side to support himself, and whether his head and trunk curve to the opposite side a bit to counterbalance this impending fall. If he maintains his balance in this way he can be termed well able to "sit alone." As a rule, the baby will not develop the ability to guard against falling backwards by protective extension of the arms to the rear until he is about 12 months of age.

Once the child develops reasonable security in sitting, he tends to use his hands more effectively. Therefore, in appraising the child's ability to use his hands while sitting, it is always wise to note first if the child needs lateral or posterior support. It may be that the child can use his hands to hold or transfer a block or toy, but is prevented from doing so by his need to use his arms and hands for support. It is quite possible, for instance, for a child with cerebral palsy to have sufficient hand function, intelligence and interest to learn to eat by himself but be unusually delayed in developing sitting balance. Under such circumstances, he may need to be positioned with secure arm, back and foot supports before he can display the needed skills with his hands. If these factors are overlooked, the situation can prove quite frustrating and may be inappropriately interpreted by all concerned.

Crawling, creeping, standing and walking

About half of all normal infants begin to creep or crawl between 6 to 12 months of age; by 12 months the infant should pull himself erect, and by 18 months begin walking independently. Failure to walk independently after 18 months of age constitutes an index of suspicion.

By the age of 3 years, the child should have achieved motor independence, including walking up stairs. Delays in single items of development may be due to a variety of specific causes, including motor (dislocated hip), sensory (deafness), or emotional (schizoid) causes (*17, 27*). An overall developmental lag in several items may be due to cerebral palsy, mental retardation, or related cerebral dysfunctions. A peculiar method of creeping or crawling may also warrant special evaluation. For instance, some children with cerebral palsy develop a hopping type of locomotion wherein both knees are drawn up simultaneously under the trunk, followed by an awkward push forward.

During recent years, considerable attention has been focused upon a type of cerebral dysfunction variously described by different investigators as brain-damage disorder, minimal neurological handicap, or the hyperkinetic behavior syndrome (*38*). It is of interest here to note that children who later manifest hyperkinetic behavior disorder (characterized by involuntary and constant overactivity) may be significantly advanced in achievement of the milestones of motor development.

Such children may climb out of the crib before 1 year of age and walk early. Parental histories (*17*) also indicate that some of these children cannot be kept in the play pen, get into everything, run rather than walk, find it intolerable to sit quietly (even at meal times), are hyperirritable, cry readily, and wake several times during the night. Such symptoms warrant referral for thorough professional appraisal, for the sake of both the child and the family. Some children who manifest hyperkinetic behavior patterns in later childhood display no evidence of this disorder during infancy.

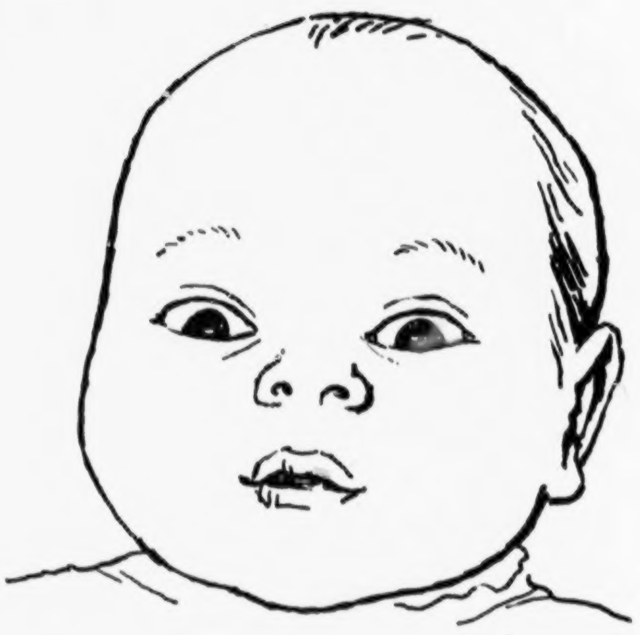
The child who is greatly accelerated in phases of growth and development might be evidencing a generally superior endowment. However, an unusually superior individual may have a normal developmental course or even be delayed in some aspects. The nurse must therefore remain objective at all times and be guided by the general rule that a deviation of 3 months in the achievement of developmental milestones constitutes valid reason for referral to medical attention.

Particularly useful aids in sharpening observations along these lines are two films entitled "Neurological Evaluation of the Infant" and "Neurological Evaluation of the One Year Old." These films contrasting normal and abnormal development were made by Dr. Richmond Paine, particularly for use by physicians, as part of the previously mentioned Collaborative Project sponsored by the National Institute of Neurological Diseases and Blindness. Properly interpreted, they are also very helpful to nurses and other personnel responsible for the care of infants and young children.

Special Senses, Sense Organs, and Speech

Vision and inspection of the eyes

Many new methods are now being developed to test the vision of young children not yet able to read, such as the Snellen illiterate E test or the new picture tests (*39, 40*). However, none of these are directly applicable to the very young infant. At first, the ability to fix upon and follow objects is the principal evidence that some vision is present. Most newborns will, on one occasion or another, follow a bright toy or light with the eyes. Reliable following of objects is noted more readily at 6 to 8 weeks. The first evidence may be response to the mother's smile. Greatly disconjugate or ceaselessly roving eye motions suggest blindness. While the infant may exhibit problems of convergence (which usually begins at about 3 months), a constant and fixed strabismus warrants careful medical appraisal at any age.



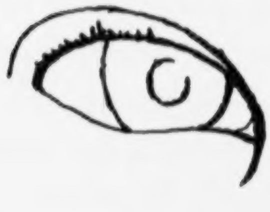
Setting-sun sign

The setting-sun sign, in which only the upper part of the iris appears above the lid when the eyes are at rest, is an important observation that should be called to medical attention. The infant's eyes should be examined also to note whether the cornea of one eye is larger than the other. This could be a sign of congenital glaucoma, which could lead to blindness if not detected and treated very early. The presence of cataracts may sometimes be noted in the infant; the nurse should remain alert to a milky type of film or clouding. As a child is brought to a stronger light source (for instance, the nursery window), the nurse should see if his pupils react by contracting and do so equally. As the child's face is cleansed or wiped, there are many opportunities to watch for the blink reflex.

It is also suggested that all babies be inspected for epicanthic folds (folds of skin across the inner angles of the eyes). In a nonoriental baby, they may be an indication of Down's syndrome or other congenital disability, and such a child should have continued supervision. It should be kept in mind, however, that epicanthic folds could be a normal manifestation even in a baby of nonoriental parentage.

Unusual placement of the eyes, one eye larger than the other, unusually heavy brows which meet over the bridge of the nose and a wide-eyed and particularly forlorn gaze are other signs which may be related to chromosomal aberrations. Or a single slight deviation may be found, such as one eye so slightly smaller than the other that it has neither medical nor cosmetic significance. Even this minor observation should be recorded, however, since, as previously mentioned, the presence of three or more minor anomalies indicates that the child should be under surveillance for a possible major disorder. The times when the infant is bathed or his face cleansed provide excel-

Epicanthic fold



lent opportunities for inspecting the eyes for such anomalies.

Symptoms such as redness, discharge or swelling about the eyes are worthy of note at any age. Further signs of possible visual difficulty as the child grows older include: holding objects very close to the face; closing one eye repeatedly or tilting the head at an unusual angle when attempting to visualize objects; appearance of discomfort when in a brightly lighted environment; complaints of burning or itching, headache, and frequent rubbing of the eyes after a session of watching TV or going to the theater. Unusual delay in recognizing colors may be another clue to visual difficulty. Visual, perceptual, or other problems may be suspected in the older child who lags behind his peers in the ability to stay within the lines when coloring or who is unable to copy a diamond shape or to catch or bat a ball. The child who is always tripping and bumping into things may have a visual defect, as well as possible neuro-muscular or other difficulties.

Hearing, speech and language

Development of hearing—The Ewings in England state (*41*) that active response of infants and children to sound develops in four stages: automatic reaction to unexpected or loud sounds, localizing the source of sound, comprehension of speech, and ability to communicate comfortably while playing. Hardy et al. (*42*) have reported that the newborn will respond to various short, sharp and fairly loud sounds in a largely reflexive manner (Moro, blink). In the period from 3 weeks to 14 weeks of age, the eye response may include opening the eyes or squinting. Some movement of the head may also be noted at this time. Older babies (15 to 30 weeks of age) are more likely to give a definite head turn as a response, but these responses are all apt to be fleeting and variable since the motor system is still immature.

Harrington (*43*) points out that hearing is also a *learned* behavior involving sensitivity to various sounds, discrimination, recognition of differences among sounds, understanding, interpretation, storage, recall and usually an appropriate motor response. By 7 or 8 months of age (and often before this), the normal infant will have "learned" to listen and to hear. His motor development makes it possible for him to relate spatially to many sounds in the environment. Normal response at this time involves a quick turn of the head in the direction of the sound. However, the child is more apt to respond if the following factors obtain: the sound is a familiar one (a favorite toy, a spoon rattling in his dish at feeding time); the sound is made within a horizontal level with his ears; the sound is made reasonably near the child; and the infant's responses are being appraised in a relatively quiet environment.

Gesell (*44*) states, "Diagnosis in early infancy is indeed difficult because there are no practical, objective methods of measuring auditory acuity in infancy, and because the infant apparently gets along so well without hearing. Many of the cases which elude early diagnosis are selectively deaf because auditory mechanisms may receive only parts of sound patterns. They live not in a world of silence but of smudged sounds." He lists signs suggestive of deafness in infants and young children, organizing them in certain categories, as shown below. It will be noted, however, that most of these signs refer to children older than 8 months.

(1) Hearing and Comprehension of Speech
    General indifference to sound.
    Lack of response to spoken word.
    Response to noises as opposed to voice.

(2) Vocalizations and Sound Production
    Monotonal quality.
    Indistinct.
    Lessened laughter.
    Meager experimental sound play and squealing.
    Vocal play for vibratory sensation.
    Head-banging, foot-stamping for vibratory sensation.
    Yelling, screeching to express pleasure, annoyance or need.

(3) Visual Attention and Reciprocal Comprehension
    Augmented visual vigilance and attentiveness.
    Alertness to gesture and movement.
    Marked imitativeness in play.
    Vehemence of gestures.

(4) Social Rapport and Adaptations
    Subnormal rapport in vocal nursery games.
    Intensified preoccupation with things rather than persons.
    Inquiring, sometimes confused or thwarted facial expression.
    Puzzled and unhappy episodes in social situations.
    Suspicious alertness, alternating with cooperation.
    Markedly reactive to praise and affection.

(5) Emotional Behavior
    Tantrums to call attention to self or need.
    Tensions, tantrums, resistances due to lack of comprehension.
    Frequent obstinacies, teasing tendencies.
    Irritability at not making self understood.
    Explosions due to self-vexation.
    Impulsive and avalanche initiatives.

Dr. Gesell states further that ideally the diagnosis of congenital deafness should be made at about the age of 6 months. Therefore, a very special effort should be made to observe the behavior of infants and their responses to sound within the first weeks and months of life, as well as later in the general course of development. In the older child, it may be noted that he frequently places his hands on a speaker's face; tends to hold a ticking clock or little radio up to his teeth; or places his teeth up against a TV set as if to bite it. These behaviors may signal a hearing loss and attempts to identify various vibrations. It is important also to pay attention to what the family has to say, since an alert mother or experienced grandparent may well be the first to detect and recognize a hearing defect.

It is possible that the nurse may come in contact with a child who has an excessive reaction to sound, such as an unusually marked Moro response to sound during the immediate neonatal period. However, determining the presence and degree of excess is usually not within the purview of any but the most experienced pediatric nurse. If excessive reaction is suspected while the baby is in the hospital, it is easily checked by a physician. If a public health nurse on a home visit has some question along this line she might discuss it with her nursing supervisor, and, if she concurs, advise that the infant be seen in the physician's office or a clinic. While it is possible that an excessive reaction to sound may indicate some central nervous system problem, this is a difficult matter to assess and the nurse should avoid alarming the parents. On the other hand, by carefully recording observations and sharing them with the physician before a child comes to the office or clinic, the nurse may materially assist a busy physician to plan ahead for the extra time he may wish to allocate, or special tests he may wish to plan.

External examination of the ears—As soon as possible after the child is born, his ears should be inspected for the presence of any deformity, asymmetry, unusually low placement, peculiar slant, cosmetically significant protrusion, skin tags or other anomalies. The area immediately in front of the ear should be particularly well examined for the presence of a dermal sinus. It is possible that even a tiny pin-hole size opening could be an avenue for serious infection by staphylococci or other organisms. The external size of the sinus gives no indication of its possible depth into vital body tissues. The demonstration bath again provides a particularly fine opportunity for surface inspection of the ears by the public health nurse.

Hilson (*45*) has called attention to the fact that a malformed ear may signal the presence of an associated anomaly of the genitourinary tract. He states further that genitourinary malformations are the commonest anomalies found in the population over the age of 5 years, a matter of some interest for the nurse working with the older child.

Development of speech and language—One of the most welcome sounds on earth is the vigorous cry of a lusty infant at the moment of birth. During the early hours and days of life, the nature, pitch, intensity and frequency of the infant's cry are important components in the rubric of nursing appraisal. Physicians rely heavily upon the skilled pediatric nurse to immediately detect and report the high-pitched cry of the possibly brain-injured, the little mewing sound characteristic of some chromosomal abnormality, the very feeble cry of the weak, or the grunt which denotes respiratory distress. It is hoped that current studies and recordings will soon provide more precise measures for helping the nurse distinguish the cries that indicate abnormal states in the infant.

Except for the periods of crying the very young baby may make comparatively few sounds other than little "noises in the throat." By the time he is 2 months of age he vocalizes a bit. By 3 months, chuckles may be added to the cooing noises; and by 4 months, he may laugh aloud. Babbling is usually noted by 6 months of age; approximately 50 percent of the babies will babble in two or more sounds by this age.

There is a great range of normal variability in the actual development of speech. Many babies say "mama" or "dada" at 9 months, add two or three words at the age of 1 year, use about 10 words at 18 months, and say little two- or three-word sentences at 2 years of age. Some babies are quite precocious in the development of speech and effective use of language. This may be a factor suggestive of a generally superior native endowment. On the other hand, somewhat precocious development may simply be a reflection of the sociocultural environment. It is possible that a normal or even a very bright child will be delayed in the development of speech. For instance, the child surrounded by doting adults and older siblings may literally have no need to talk since his every need is anticipated. Discretion is therefore always in order regarding the assessment of the rate and extent of speech development. As a basic guideline, it is suggested that any speech patterns in a child of 4 years and over which are so deviant as to make communication difficult or impossible certainly warrant specialized evaluation. These would include articulation problems, stuttering (hesitant, repetitive or blocked speech), and any marked deviations in pitch, rate or intensity of the voice.

Inspection of the mouth and nose

The infant's nose and mouth should be carefully examined for any apparent anomaly. The feeding situation provides many opportunities to inspect both. A cleft lip is immediately apparent, but it is possible that a partially cleft palate could escape detection until later in life. As a case in point, a 5½-year-old child was recently found to have a partially cleft palate. This boy lived in a large city; had been delivered in a major metropolitan hospital; and followed through home visits by public health nurses; he had attended a well-baby conference and was hospitalized at the age of 4 because of a leg fracture. Yet the cleft was not detected until his kindergarten teacher became concerned about his "peculiar" speech. The otolaryngologist who then examined the child pointed out that this youngster might have developed a severe infection in the brain because of the nature of the cleft. The dentist to whom he was also referred found an associated and significant dental problem which might have been less difficult to manage if recognized earlier. In addition, the child was already adversely affected by his playmates' ridicule of his peculiar voice and speech.

Smell and taste

Some infants may indicate awareness of taste by facial expression. The reaction to a bit of sugar usually elicits sucking and smacking of the lips. Salt, on the other hand, tends to produce a grimace and little or no sucking. André-Thomas (*25*) states that the child may also protrude the tongue to "get rid of it" and that these reactions are most marked after a feeding.

It is not easy to assess the baby's ability to taste or smell and it may be of little importance to do so during infancy unless the baby has a sucking problem. In that case, the ability to elicit appropriate responses to certain taste and olfactory stimuli may be vital to the child's wellfare. This author has observed (*46*) that considerable success in feeding could be achieved with some infants who have aberrant suck and swallow patterns by instituting some carefully selected taste, olfactory and other stimuli into the feeding process. (A bit of honey applied to the tip of the nipple, chilling of the nipple, careful administration of light whiffs of aromatic spirits of ammonia coupled with appropriate positioning of the infant, are some of the measures through which sucking was enhanced and adequate nutrition achieved without resorting to gavage or other more heroic means.) It will be found that the work of Pratt, et al., (*47*) is a particularly useful reference when the presence or absence of smell and taste need to be determined during infancy.

Sleep Patterns

There is considerable variability in the sleep patterns of the neonate. Wolff (*48*) and Brazelton (*49*) have pointed out the wide range of spontaneous jerks and twitches which are entirely within normal limits, even though they may occasionally awaken the child. The studies of Parmalee et al. (*50*) indicate that infants sleep somewhat less than the 19 to 22 hours per day previously indicated in the literature. The 75 infants studied during the first 3 days of life were awake on an average of 7 to 8 out of 24 hours, and slept 16 to 17 hours (or 65 to 70 percent of the time). The longest wakeful period ranged on the average from 1.9 to 2.3 hours. The sex of the child seemed to have no influence upon these patterns. A nurse who carefully observes an infant in the nursery and finds that he sleeps only about 16 hours instead of 22 and that this is normal for this baby, can greatly reassure the mother by giving her this information, and should do so, before she goes home with the child. Otherwise, this apparent "sleeplessness" could cause considerable anxiety.

Sometimes, unusual patterns of sleep, drowsiness and listlessness, or the opposite characteristic of excessive wakefulness, irritability and crying may be significant indications that all is not well with a child. Marked and consistent deviations along these lines rarely escape early detection. However, the infant in the hospital who is not rooming-in with his mother has many "mothers." Increasing use of part-time staff, plus the fact that the entire personnel in a nursery changes several times in any 24-hour period, suggest that sharpened observations and reasonably detailed records are needed to detect the more subtle deviations of this type. An infant may appear a bit fussy or unresponsive at times during any one staff tour of duty without arousing concern. A cumulative record of such behavior repeated throughout a 24-hour period, however, can help detect a significant underlying difficulty which would otherwise escape attention during the shortened hospital stay of mothers and babies after delivery.

After hospital discharge, the young or inexperienced mother may be disturbed by her infant's irritability but fail to report it because she thinks the behavior is due to her own inadequacy. Another mother may rejoice that her infant is unusually "good" without realizing that he is actually abnormally listless or drowsy. Therefore, when such behavior is noted in a child at a well-baby conference or pediatric clinic, public health personnel should take particular care to obtain a reasonably complete assessment of the child's behavior in the course of a home followup program.

Infantile Seizures (Spasms)

The infant may have a seizure or other episode, accompanied by an unusual position, which subsides and may not be present when the physician makes his rounds in the hospital or sees the child at a clinic or well-child conference. The nurse should therefore always be alert for and carefully record any such episode. Infantile myoclonic seizures may be evidenced by a sudden contraction of the flexor muscles of the trunk, which may be accompanied by abrupt flexion of arms on the chest and thighs on the trunk. The forearms may be retracted and the hands pulled to either side of the head, so that the seizure may resemble the Moro reflex. A sharp cry may precede or accompany the seizure. The face may assume a momentary blank or shock-like expression. In some instances, a sudden noise, some manipulation or feeding may precipitate the attacks, while in others they occur just before the onset of true sleep or immediately on waking.

Petit mal, minor motor, psychomotor and grand mal seizures may all occur during infancy, but the minor motor type is most common. Baird *(51)* has called attention to abdominal epilepsy in infants and young children. This is a possibility of particular importance to the public health nurse in her home followup of infants who are not under regular medical surveillance and who have unusually persistent or severe episodes of so-called "colic." A helpful reference on infant spasms or seizures, which contains excellent illustrations, is "Infantile Spasms"—No. 15 of the "Clinics in Developmental Medicine," published by the Medical Education and Information Unit of The Spastics Society in association with Wm. Heinemann Medical Books, Ltd., The Press at Kingswood, Tadworth, Surrey, England.

Fontanels

The fontanels should not be bulging, excessively wide, deeply depressed or barely open in the early months. Normally, the anterior fontanel closes some time between the 6th and 18th months. If it is found that the fontanels barely admit the tip of a finger when the child is 6 months of age or are still showing little evidence of closure by 12 months, bulge, or are depressed, medical evaluation should be obtained.

Measurements

Head circumference

There are many excellent charts available, such as the Developmental Record devised by Dr. Eric Denhoff of Meeting Street School in Providence, R.I., which can be very helpful to the nurse in detecting deviations from the normal head circumference range. The measurement charts reproduced below, developed for the Children's Medical Center of Boston, include head circumference curves.

Head circumference measurement (occiput-supraorbital ridges) is approximately 13 to 14 inches at birth. As a general rule, there is a 2-inch increase during the first 4 months, with another 2-inch increase by the time an infant is a year old. From then on, growth of the head is exceedingly slow, totaling only about 4 inches more by the age of about 20 years.

If an infant is at the high extreme of head circumference at birth and continues on the uppermost level, or goes above the normal curve, or exceeds the chest circumference by more than 1 inch at 3 months, medical opinion should be sought.

On the other side of the curve, if the head circumference is less than 12 inches, and the chest circumference exceeds the head size at the age of 3 months *(17)*, or the head size remains in the lowest possible range of the normal growth curve, medical referral is warranted.

Chest circumference

Chest circumference is measured at the level of the nipples with the baby lying outstretched. The head size usually exceeds the chest size by 1 inch until about 1 year of age, then the head-chest relationship is equal until about 18 months, when the chest begins to exceed the head.

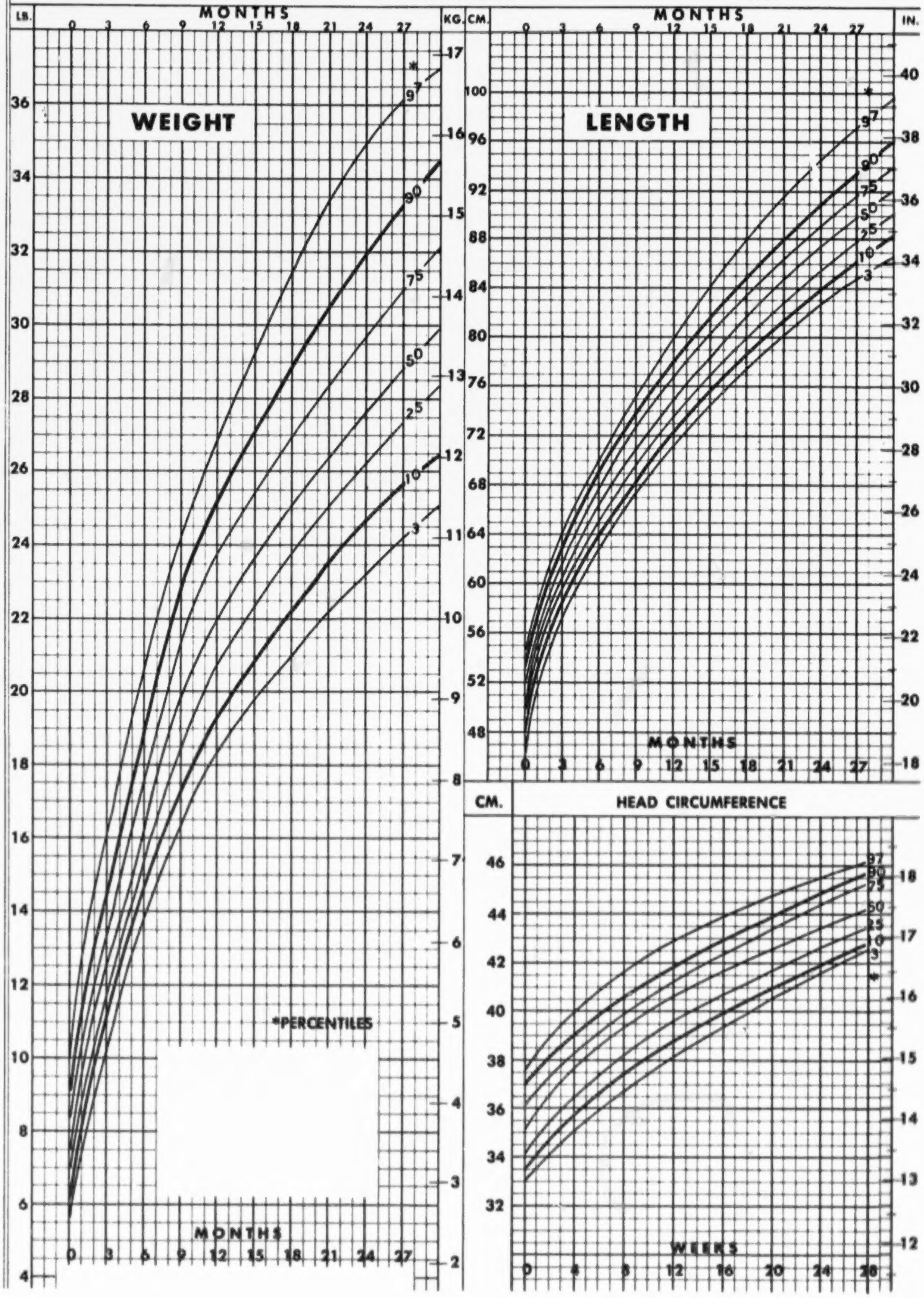
Height and weight

There are numerous charts, such as the Denhoff Developmental Record, which show by lines or shadowed curves normal ranges of height and weight. Jackson and Kelley *(52)* have developed charts for use in pediatric practice. The Iowa growth charts are frequently used, and copies can be obtained by writing to the Division of Publications, East Hall, State University of Iowa, Iowa City. The charts for infant boys and girls developed by Dr. Harold C. Stuart and associates of the Harvard School of Public Health for use at the Children's Medical Center in Boston are reproduced here as an example of such charts. Watson and Lowrey include several useful forms of this type in *Growth and Development of Children* (53).

It is always difficult to predict precisely when a premature infant will catch up in height and weight. Dunham *(54)* states that the physical development of the premature approximates that of term infants during the early months, if corrections are made for the *gestational age*. She also

INFANT BOYS

NAME BIRTH DATE NO.

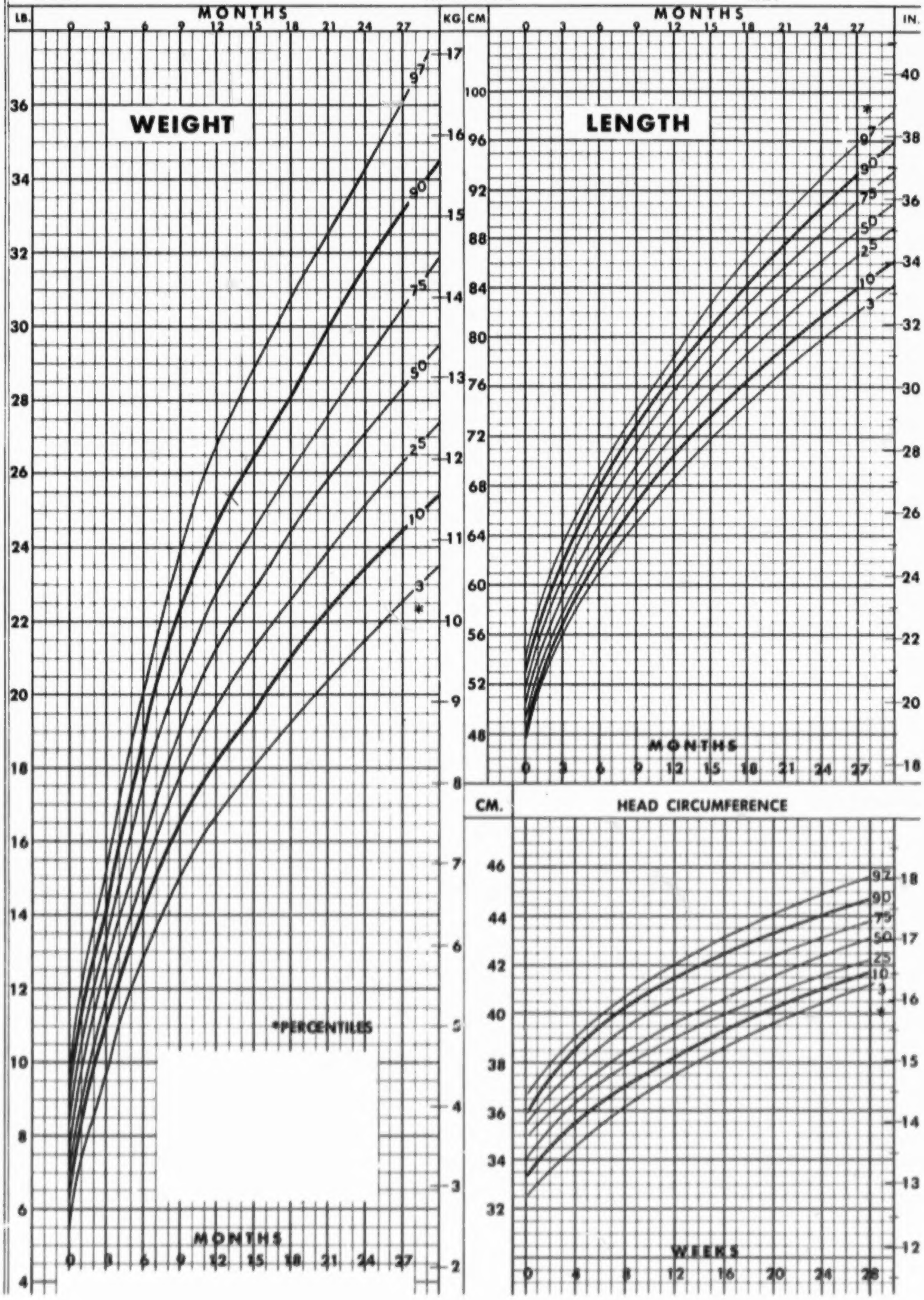


THE CHILDREN'S MEDICAL CENTER, BOSTON - ANTHROPOMETRIC CHART

FORM 305

INFANT GIRLS

NAME BIRTH DATE NO.



THE CHILDREN'S MEDICAL CENTER, BOSTON - ANTHROPOMETRIC CHART

FORM 202

points out, however, that data are lacking whereby it can be predicted just when the very small premature will catch up totally with his full-term counterparts. Therefore, the rural nurse who cares for families who live at great distances from medical facilities must use special caution in these cases so that she does not "cry wolf" too soon and yet does not overlook the infant who really needs medical attention. At best, only rough guides can be given.

Knobloch (*55*) suggests the following very helpful conceptualization as one guide for nurses in this regard:

"Technically a premature infant never loses his given amount of prematurity. There is a point, however, at which the amount of prematurity is an insignificant part of his total life span and he would be expected to act like a full term infant of the same age. There is no specific age when this point is reached. It depends on how much prematurity is present, and its effect on behavior depends on the age of the child when the appraisal is taking place. For example, a 40-week-old infant who is only two weeks premature would be acting like a 38-week-old baby; the two weeks of prematurity is only one-twentieth of his life and is no longer significant. The same age baby who is 10 weeks premature would be acting like 30 weeks; the 10 weeks here represents one-fourth of his life span and if correction is not made for it he might be considered lagging in development. The 10 weeks does not become one-twentieth of the life span until 200 weeks of age—almost 4 years. This principle can be applied at any age and for any amount of prematurity and one can then decide if retardation is real or only apparent because of failure to correct for prematurity."

Problems of Neglect and Abuse

It is unfortunately possible that an essentially normal infant may fail to thrive because he is neglected. Another tragic possibility is abuse of the child. Kempe et al. (*56*) suggest the following symptoms as worthy of careful attention in appraising the possibility that a child is in jeopardy: "The (battered-child) syndrome should be considered in a child exhibiting evidence of fracture of any bone, subdural hematoma, failure to thrive, soft tissue swelling or skin bruising in any child who dies suddenly, or where the degree and type of injury is at variance with the history given regarding the occurrence of the trauma."

Appropriate assessment of parental attitudes and environmental factors is an important facet of all appraisals of infants and children, but it may well be of critical importance if there is any reason to suspect neglect or abuse. The public health nurse as she goes about her rounds has many special opportunities to observe the situation in the home and neighborhood where the child lives. Naturally, she must exercise discretion as well as discernment. Her records should be objective and her findings documented by reports of her actual observations. She should, however, share any concern about an apparently neglected or abused child with her nursing supervisor. On the basis of her experience, skills in assessment and judgment, the supervisor will see that all pertinent factors are duly recorded, and, if warranted, arrange for reports or referrals to the appropriate persons or agencies. Over 41 States now require physicians and hospitals to report suspected cases of child abuse to either welfare or law enforcement agencies in the community. Some statutes also include nurses among those who are expected to report. The nurse should be well aware of her responsibilities under the law in her State.

The supervising nurse in the emergency room of the hospital may also be in a position to note repeated admissions of a particular child, which might escape detection by the changing personnel in the emergency department. In like manner, the staff of a pediatric outpatient clinic may be in a position to become aware of such children. In some hospitals and clinics, recordkeeping systems are used that will call attention to cases of repeated admissions. Staff of a pediatric inpatient ward may note in a case where there is reason for suspicion whether the child is visited by his parents or other family members and be alert for the way in which they respond to each other.

Further discussion of this subject will be found in articles by the Committee on Infant and Preschool Child, American Academy of Pediatrics (*57*), Harold Jacobziner (*58*), and Vincent J. Fontana (*59*).

Psychosocial Components

Studies by Gesell and his colleagues (*60, 61*) point out the many intrinsic and extrinsic factors which may be involved in social and emotional development. For instance, in order to achieve a psychosocial milestone of development usually attained at about 2 months of age, that is, "a smile in response to a smiling person," the infant needs a smiling person to respond to, as well as sufficient visual acuity and the neuromuscular ability to smile. The infant who participates with glee in games of "peek" and "pat-a-cake" at about 9 months needs to be taught these little games in a pleasant way and has to have someone to play with, as well as an appropriate maturation of the involved areas of the central nervous system. In like manner, the child who is able to overtly demonstrate his affection at the age of 1 year needs to have been cuddled and caressed by affectionate people, as well as the necessary neuromuscular and neurosensory development to display his warm response to others with hugs and kisses.

According to Gesell (*44*), some abnormality or lag in the development of social and adaptive behavior may be the first indication of environmental stress or deprivation. In recent years there have been extensive contributions to the scientific literature on the effects of abnormal environmental situations or of deprivation on the psychosocial development of children (*62-65*).

The studies of Esman (*66, 67*), Goldfarb (*68, 69*) and others show that actual mental illness of the child may be a cause of deviations observed in his social and adaptive behavior.

While various factors may work upon the child's psychosocial development, it should be kept in mind in viewing the situation that even a basically normal child can present such problems that it is ***he*** who adversely affects his parents and environment, and consequently his own psychological and physiological (*70*) development. Brazelton (*71*) has described the interaction of a "difficult" but "normal" neonate with his environment—the strong influence he wielded in determining the nature of the mother-child relationship, and how the resulting problems in this relationship tended to reinforce the difficulties of the child in psychosocial and physical adaptation to the environment.

It is also to be expected that situations will be found in which psychosocial and physical aspects of behavior are disturbed but so interrelated that detailed interprofessional evaluation is required over a considerable period of time in order to determine the etiology, nature and extent of the difficulties. The following discussion related to feeding problems of the neonate and the associated family problems which may be involved may serve to illustrate this point.

Review of case

An obviously distraught young mother, who had moved into the city shortly before the birth of her first child, arrived at a child health conference in tears, stating that her 3-week-old infant "hated" her. Encouraged and gently guided to share her concern, the mother stated (and hospital records later verified the fact) that her pregnancy and delivery had been normal. The mother felt that her baby had been "very strong since birth." She had encountered difficulties in feeding him before she left the hospital, however, and the situation had become worse after her return home; it took over an hour for either or both of the parents to "get him to take 1 or 2 ounces of formula." She also stated that the baby "refused to eat most of the time" and seemed to "push her away" when she tried to feed, hold and comfort him. Asked to describe the nature of the baby's feeding problem, she said he "always kept spitting out the nipple," "choked a lot" and kept "pushing himself away." The child's father later confirmed these observations, adding that he wondered if he was truly "cut out to be a father." The mother later expressed her feeling that the difficulties were probably all her "fault"—her mother had warned her she was "too young for motherhood." She readily admitted that she had never had experience in caring for infants, but that she and her husband had truly wanted this child.

There were no indications in the hospital record that problems were noted either in the mother's attitudes or the child's condition. The mother stated that the hospital staff had encouraged her to believe that she would improve in her ability to feed and comfort her child as soon as she "became more accustomed to the process and could relax." However, neither parent had been able to relax; both were becoming increasingly tired and nervous, "snapping at each other" on the slightest provocation.

During a staff meeting at the child health conference, the pediatrician stated frankly that he too had felt that the baby's apparent difficulties probably stemmed from his parents' inexperience and anxieties. This early impression was somewhat reinforced when his preliminary examination revealed that the infant appeared grossly normal. During a second examination, he found that the baby displayed a definite tendency toward hypertonicity and a fairly marked asymmetrical tonic neck reflex to the right. Observing the manner in which the mother held the child to comfort and feed him, it was noted that the infant tended to rear backwards because of his somewhat strong extensor tone. An apparent tongue thrust also tended to push the nipple out of the mouth. As the infant struggled to feed, he became increasingly hypertonic and the mother increasingly nervous, her trembling arms then contributing to the infant's frustration, insecurity and hypertonicity. Further observations clarified the mother's contention that this 3-week-old infant was "pushing himself away" from her. Actually, as she turned his head toward her to feed him, the asymmetrical tonic neck reflex pattern caused his chin extremities to extend, and the mother felt the pressure of his hand and arm "against" her. It is not yet known whether or not this infant has a definite handicap. He is being very carefully evaluated and his growth and development closely followed.

Prompt guidance has been provided both the parents and grandparents to help them to understand the infant's behavior. Immediate help is also being rendered to facilitate the daily care of the child. For instance, many nipples were tried to find one that would make it easier for this particular infant to suck and swallow. A special type, which has a soft rubber, breast-like flare and a rather large nipple end on a short shank, proved most satisfactory. It was also found that the baby fed more easily if his arms were placed in front of him and if he was held fairly upright in the mother's right arm, rather than her left. Although about 25 minutes of patient effort is still needed to complete his feedings, the process is much easier for all concerned.

When it was noted that the baby seemed to have a hyperactive Moro reflex, definite plans were made to provide a more quiet atmosphere for sleep. It was also found that he rested better in the prone position, but the mother was afraid he would suffocate. Since he had a well-developed avoidance reflex and could raise and turn his head in prone, it was demonstrated to the family's satisfaction that he would be safe as well as more comfortable in this position, as long as there was a tightly fitted

> bottom sheet in the crib and his coverlet was properly placed. In essence, both the child and the family are getting along quite nicely and becoming more relaxed and comfortable during the continuing evaluation process. While the child's apparently deviant behavior may be found to be within the normal range of variability, the family is facing the fact that he may be handicapped. Meanwhile, they are already being helped to provide a more favorable environment for his care and take pleasure in the fact that he is beginning to smile, coo, and evidence other salutary progress in several aspects of total growth and development.

The physician at the child-health conference postulates that all of the problems in this case originated and were probably evident before the mother left the hospital. However, because of the shortened hospital stay, coupled with the fact that the entire nursery staff may change several times in a 24-hour period, more precise observations and detailed hospital records would have been needed to bring such matters to appropriate attention before hospital discharge. Since the nurse is most intimately concerned with observations of mother-child activities related to feeding, and the physician depends heavily upon her observations during his absence from the hospital, nursing records play a vital role.

Recent studies (*72*) suggest that much needs to be done to improve current practices regarding the nursing record. In the case of the neonate, for instance, it is important to note the positive aspects of his behavior, such as the presence of a good sucking and rooting reflex, the ability to swallow, normal postures and tone, etc., as well as any abnormal behavior which may be seen. It is important also to note all of the pertinent factors evident in the mother's behavior during feeding (whether she appears comfortable, reasonably skilled and relaxed or very anxious and insecure).

Some infants may have difficulty sucking or swallowing and regurgitate rather more than others, yet still be within "normal" limits. The nurse nevertheless has a responsibility to note such behavior on the record. The mother may or may not bring the matter to the doctor's attention; her reactions to the infant's general behavior may mask feeding problems when she talks to the physician. If the infant has feeding difficulties deemed within normal limits by the physician, the hospital nurse can do much to reassure the mother along these lines. She can also render an important service to the public health nurse who will follow the case by means of the "nurse-initiated" referral report, in which she describes the hospital nursery feeding experiences and points out the difficulties which may be encountered by the mother and/or the nurse, when the child goes home.

Some mothers going home with such a child may purchase a dozen nipples, progressively enlarge the holes and feed many times during the day and night until the child gets sufficient nourishment. Weight gain within normal limits may then be found, on return to the well child conference. Caution: a normal weight gain may have been achieved at the price of a continuum of frustrating experiences which combine to create a difficult mother-child relationship. Concentrating attention on weight gain alone may prevent recognition of a developmental problem.

It is worthy of note that a child with a feeding difficulty tends to be generally hyperirritable, have a prolonged or particularly troublesome problem with colic and be difficult for the mother to comfort and satisfy. While all of these factors may prove to be benign and transient in nature, if persistent they may turn out to be early signs of cerebral palsy or other serious disorders *(17)*. Also, the difficult mother-child relationship which is involved in a stormy neonatal period may not only be of some immediate concern but may also set a pattern for the future which can have a markedly deleterious effect on both child and family.

Some mothers are surprisingly reluctant to admit to a physician or nurse that they cannot feed or comfort their children, since they feel this marks them as inadequate or unfit mothers. The prevailing custom of living in isolated families may not give a young mother the chance to learn the needed skills. The public health nurse may often be the only member of the maternity and child health professional team whom the mother will see with any regularity during pregnancy and after discharge from the hospital. The mother is therefore more apt to share her worries with this nurse, and the nurse is likely to be in the best position to help her evaluate the situation and see that a medical appraisal is obtained when warranted.

Gallagher *(73)* and other investigators have clearly defined the impact of parental rejection or oversolicitude upon the handicapped child. These detrimental attitudes may well originate long before the diagnosis of exceptionality in the child is made or even suspected. If persistent and unresolved, they may complicate or even negate all succeeding efforts toward habilitation. The nurse should be alert to all the various factors that may be involved; take discreet but purposeful action to assure continued surveillance of the child and support for the mother; promote a prophylactic as well as a therapeutic approach toward appropriate and astute management of the problem; and seek professional counsel for those cases that do not respond to normal supportive procedures.

IV

PROCEDURES AND DEVICES FOR APPRAISAL

IN THE PAST, primary attention in well-child and pediatric clinics was usually focused upon prevention of communicable disease, basic parent education in nutrition and hygiene, and care of the sick child. Increasing attention is now being given to the broad spectrum of growth and development, particularly in the well-child followup programs. Nurses are increasingly involved in the clinics' parent and family life education programs along these lines.

There is no one procedure or technique that is the method of choice for all situations in which nurses appraise the growth and development of infants and children. The procedures will vary depending upon the needs of the parents, age and status of the child, and the situation in which he is being appraised. Following are a few of the possible approaches.

Apgar Scoring System

Many hospitals are using or plan to use the Apgar Scoring System (*74*) as the initial procedure for appraisal of the neonate. In the past, appraisal was usually carried out by the physician, but many nurses are now assigned this responsibility. The Apgar chart gives an index of the infant's depression or lack of it at birth by rating five easily observed signs: heart rate, respiratory effort, muscle tone, reflex response, and color.

One minute after delivery is completed (disregarding the cord and placenta), the infant is scored 0 or 1 or 2 for each of the signs (see chart). A total score of 10 indicates that the infant is in optimum condition. If the score is 5 or more, the infant rarely needs special resuscitative measures. Approximately 70 percent of newborns score 7 or better. A total score of 4 or under demands immediate attention. In some hospitals, the appraisal is repeated 5 minutes after birth.

APGAR SCORING CHART

Sign	0	1	2
Heart Rate	Absent	Slow (below 100)	Over 100
Respiratory Effort	Absent	Weak cry, hypoventilation	Good strong cry
Muscle Tone	Limp	Some flexion of extremities	Well flexed
Reflex Response (tangential foot slap)	No response	Some motion	Cry and withdrawal of foot
Color	Blue, pale	Body pink, extremities blue	Completely pink

Drage et al. (*75*) and Berendes (*76*), reporting on data from the Collaborative Project, state that there is a strong association of both the 1 and 5 minute scores with birth weight—low birth weights being associated with low scores. There is also a tendency for larger babies (weights over 4,000 gm.) to have low scores. Drage (*75*), and Apgar and James (*77*) report a strong association between low scores and neonatal mortality.

Berendes (*76*) also reports that infants with low Apgar scores are found "more readily to have neurological abnormalities at the end of the first year than those with high scores." This finding is valid within the normal spectrum of birth weights, as well as among the very small or very large babies who are generally more vulnerable. A poor Apgar score, therefore, appears to be a most useful criterion for the followup of babies who are apt to be "at risk."

Screening Tests

In many hospitals a small sample of the cord blood may be required for certain tests, including screening for the possible presence of venereal disease. Other tests may be carried out later, such as the Guthrie

(*78*) and other tests (*79*) for phenylketonuria. Public health nurses may be expected to carry out (or help the mother follow instructions in carrying out) additional testing measures after return home from the hospital. Testing the urine with "Phenistix" in the home for detection of phenylketonuria is an example of one such followup procedure currently being carried out in many communities. There are many other inborn errors of metabolism which have been identified, and additional tests are being instituted in many hospitals.

Nursery Admission Procedures

Methods of cleansing the neonate on admission to the hospital nursery are governed by accepted hospital procedures, which may include application of some prophylactic solution. It is possible to utilize the admission procedure for assessing the infant for symmetry of contour and motion, range of motion and tone, certain of the basic neurological reflex patterns, and for possible congenital anomaly, without involving any extra time on the part of the nurse or any injudicious handling of the normal baby.

Applying the hands directly rather than a wash cloth or cotton facilitates kinesthetic perception. Simultaneous use of both hands increases the possibility of detecting asymmetry of contour or motion, which is an important element in the suggested protocol for nursing appraisal. For instance, after initial cleansing of delicate areas with a cotton pledget or other soft material, both hands could be used simultaneously to apply a film of lotion over the whole body.

Weighing, measuring and dressing the baby present other avenues for continuing the appraisal. Naturally, some or all of the suggested procedures are deferred or delayed in the case of the premature or distressed infant. However, the value of serial observations is manifest for all infants, since an initially questionable finding may thereby be reevaluated, an overlooked anomaly may be picked up, or some new and untoward development may come to attention.

The vulnerability of the premature and the frequency with which multiple disabilities may be encountered among infants subjected to stress have been amply documented by many investigators, including Brazelton (*71*), Eastman (*80*), Graham (*81*), McIntosh (*82*), Smith (*70*), Wolff (*48*), and Marden (*23*). The University of Colorado Premature Infant Nursery Checklist (appendix B) can help to assure fairly complete and regular appraisal of such infants. The primary needs of premature or distressed infants will naturally influence both when and how the nursing appraisals will be carried out and it will hereinafter be assumed that appropriate allowances will be made for the special needs of such infants. However, it is important to remember that exclusive preoccupation with the basic needs of such infants can cause some of the more subtle manifestations to be overlooked.

Appraisal While Bathing the Baby

The demonstration bath is an excellent medium within which a detailed appraisal of the infant can be carried out in the hospital or by the public health nurse after mother and child return home. The appraisal protocol can be integrated into any bath process with which the mother is most comfortable. The mature nurse will also have developed a number of bath procedures she prefers to use in a variety of circumstances, depending upon the facilities available, the child's age, and the state of his health. Thorough appraisal can be carried out in any of these circumstances. It is necessary only to appropriately incorporate the particular observations pertinent to the child's age and stage of development, and remember two critical factors:

Direct contact between the nurse's hands and the infant's body is necessary to detect some of the more subtle evidences of bony deformity, change in skin texture, etc.

Use of both hands simultaneously on opposite sides of the infant's body is needed to detect more subtle evidence of asymmetry in contour and tone. One cannot depend only on visual observation or "kinesthetic recall" to carry out a trustworthy appraisal.

For illustrative purposes, let us consider what might be observed in a baby 4 weeks old.

1. To begin with, color, respiration, and posture may be quickly noted before the child is picked up for the bath. This provides a baseline observation useful for appraising whatever changes may occur when the infant is subjected to the various stimuli of the bathing process.

2. When the infant is to be placed supine on the bath pad or bathinette top, lowering him buttocks first with head slightly extended in relation to spine will provide an opportunity to note whether the Moro reflex is present, and its characteristics.

3. In washing the face, bringing the washcloth to the cheek may elicit the rooting and sucking reflexes if more than an hour has elapsed since the last feeding. If these reflexes are not noted at this time, the nurse can look for them later, nearer feeding time.

4. In an infant 4 weeks of age, the avoidance reflex should be apparent, and the nurse should watch to see if he tends to move his face away from the mildly annoying stimuli of the washcloth. If he is very sleepy or for some other reason does not display the avoidance pattern, she can check again for this reflex when she is drying the infant's face.

5. The nurse should also be alert for the following while washing the baby's face:

   Face: Very low hairline; excessively wrinkled brow; asymmetry of contour (this may be especially apparent when crying); asymmetry in the length of the nasolabial folds; an unusually fat face in relation to the skull; an unusually flat face.

   Eyes: Asymmetry in size or placement; unusual upward or downward slant; malformation; epicanthic folds (in nonoriental infant); one cornea or pupil larger than the other; corneal opacity; constant or fixed strabismus; a wide-eyed, particularly forlorn gaze; sunset sign (only the upper half of the iris showing above the lower lid); nystagmus; constantly roving eye motion. Presence of the blink reflex.

   Nose: A beak-like nose; marked asymmetry; very small or absent nares on one side. Cleansing the nostril may cause the infant to sneeze, permitting the nurse to note the presence of this reaction. She may also check any discharge for color, odor and consistency.

   Mouth: A protruding tongue; unusual salivation, mucus or frothing; abnormally small or misshapen lower jaw; and cleft lip. The nurse may see inside the baby's mouth if he is crying, but otherwise gentle pressure on the lower jaw or eliciting the sucking reflex may persuade the infant to open his mouth without protest. The mouth may then be checked for any sign of infection on the tongue; cleft palate; premature eruption of the teeth in some unusual form such as double-fused teeth; multiple and unusually tight "tongue-tie."

   External ear: Possible malformation; preauricular skin tags; dermal sinus; asymmetry of size; abnormally low set; abnormally large or protruding ears; imperforate canal (by surface observation only).

6. When the head is passively rotated to the left and right to wash the ears, the infant should be observed for a possible obligate response to head rotation in asymmetrical tonic neck reflex patterns—either to the left, right, or both. It should be noted whether such a response persists more than 30 seconds, whether the infant can "break out" of the response, and whether it is much stronger on one side than the other.
   The nurse should also watch for the presence of a complete, one-step obligate full-body rotation which may accompany passive head rotation in some abnormal states.

7. While shampooing the baby's head, the nurse can detect whether or not there is premature closure of the fontanels; abnormal bulging (which might suggest a pathological state); abnormal concavity (which might indicate dehydration). She can also check for asymmetry; overlapping sutures; presence of a cephalhematoma or caput succedaneum (cysts of the scalp). Gentle flexion, extension and rotation of the neck during the sudsing and rinsing of the head can also help the nurse be alert to any restriction of motion (possible torticollis); webbing of the neck; or a tendency toward opisthotonus. The overall tone of the infant can also be appraised during this time.

8. In soaping the chest, or when applying baby lotion, the nurse should work from the midline out, drawing her thumbs along the clavicles and checking for any asymmetry or abnormal protuberances. She should also watch for a concave or a peaked "pigeon" breast; unusual placement of the nipples; skin tags; capillary hemangiomas; pigmented nevi; unusual tufts of hair; any unusual skin texture or color.

9. The abdominal area may be checked in a similar manner but including observations for possible hernia, and any asymmetry of pelvic flare (suggesting the possibility of a dislocated hip).

10. As soap is applied to the arms, or when they are rinsed and dried, they may be flexed, extended, gently rotated inwards and outwards—put through the full range of motion. At this time, the nurse may be alert for the presence of any asymmetry of contour, length or motion; for an abnormal stretch reflex (a little "catch" or restriction of motion) on flexion-extension; any sign of distress or discomfort on rotation; and possible presence of brachial palsy or hemiparesis.

11. If the fists are tightly closed at all times, or if one fist is constantly clenched while the other opens, it should be noted. If

necessary, a gentle pressure may be applied to the back of the infant's hand, causing the fist to open, in order that the fingers and palm of the hand may be cleansed and examined.

Anomalies to watch for are extra fingers; overlapping digits (particularly the second and fifth overlapping the third and fourth); lack of fingers in whole or in part; lack of nails; webbed fingers; unusually short stubby fingers; and a simian crease (a straight line rather than an **M** shape across the palm).

12. The baby's genitalia should be examined for hypospadias or other anomaly that would be apparent to surface observation.

13. The legs and feet may be checked in the same manner as the hands and arms. However, observation for a hyperactive stretch reflex on flexion-extension at the knee is best done when the infant is in the prone position. Overall posture and position of the feet and legs should be checked. Limbs that are unusually floppy or stiff should be well noted.

14. When the infant is turned to the prone, the nurse can again observe his muscle tone—whether he is hypotonic and collapses in an inverted **U** in ventral suspension or evidences an unusual degree of extensor tone by holding his head unusually high for his age; whether he is able, when set down, to free his nose and voluntarily turn the head to the side; and whether, after he is settled in the prone position, his pelvis remains unusually high, suggesting spasticity. Reappraisal of overall arm and hand positions and checking for a possible ulnar deviation of the hand can also be carried out while the infant is in prone.

15. Running a finger down the vertebral column helps detect any unusual depressions suggesting a possible minimal spina bifida or other anomaly which might have been previously overlooked. The symmetry of the pelvic flare may again be reassessed. The "diamond" in the lower back and the gluteal folds should also be examined for asymmetry (which could indicate hip abnormality). A check should be made for the presence of any dermal sinuses. Examination of the crease between the gluteal folds for the possible presence of a sinus or cyst can also be carried out quickly.

16. The infant will usually start kicking when placed in the tub with head and shoulders supported, permitting the nurse to note whether reciprocal kicking has been established and to again appraise the baby for symmetry of contour and leg motion.

17. The infant can be inspected as he is bathed for any excoriation or other skin problems; bruises; or other signs of trauma.

18. Opportunities may arise during the bath process to assess the mother-child relationship and the attitudes of other family members who may be present or to whom the mother refers during the bath process.

The student nurse or other nurses who may be interested in a more detailed description of a bath procedure that lends itself particularly well to the appraisal process will find one in appendix A.

Guide to Normal Milestones of Development—A New Wheel Device

A variety of technical aids are available in the hospital which can prove very useful to the nurse as she assesses various aspects of her patients' status and behavior. For instance, many have found most useful the Silverman-Anderson Index (*26*) in the appraisal of respiratory status, the Colorado Premature Checklist, and similar tools which help a nurse to sharpen her observations and more precisely describe a patient's condition. A new device, "Guide to Normal Milestones of Development," a "wheel" designed to remind the nurse of basic steps in development, is included in this publication (inside back cover). The previously mentioned "Developmental Record," with the advice of its originator, Dr. Eric Denhoff (*17, 38*), formed the basis upon which this wheel design was evolved. The assistance and guidance of Dr. Richmond Paine (*29, 32, 37*) regarding the normative data which have been incorporated into the wheel are also gratefully acknowledged.

In the course of a series of seminars for nurses (*83*), many expressed the need for a relatively simple device which could be kept for quick reference in the nursing station on the pediatric ward or the public health nursing conference center. Visiting nurses requested a small device which would fit into their bags. It is hoped that the developmental wheel may help meet some of these needs.

Such a device cannot be expected to do much more than reinforce a sound background in growth and development. Many of the previously cited studies, plus those of Birch et al. (*84*) and Illingworth (85), emphasize the range of variability which may be found among normal children. Therefore, it is hoped that the facility with which the developmental wheel can be dialed forward and backward, to refer to preceding and following stages, will help the nurse focus upon the overall rate of development rather than the individual stages of any one factor.

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The wheel consists of two discs fastened at the center so that they can be rotated one upon the other. A wedge-shaped opening in the top disc permits a view of a section of the bottom disc. On the top disc are listed basic reflex patterns. The bottom disc is divided into 11 wedge sections—one each for the 1st, 2nd, 3rd, 4th, 6th, 9th, 12th, 15th, 18th, 24th, and 36th months of age. As the wheel turns, symbols appear on the bottom disc next to the names of the reflex patterns printed on the top disc; these symbols indicate whether the reflex is present (+), absent (0), evolving or diminishing (±) at that particular stage of development. Following are the basic reflexes and the symbols for each age.

REFLEX	**MONTHS**										
	1	2	3	4	6	9	12	15	18	24	36
Palmar grasp	+	+	±	±	0*	0	0	0	0	0	0
Asymmetrical tonic neck	+	+	±	±	0	0	0	0	0	0	0
Moro	+	+	±	±	0	0	0	0	0	0	0
Reciprocal kicking	±	+	+	±	±	±	0	0	0	0	0
Rooting and sucking	+	+	+	+	+	±	0**	0	0	0	0
Neck righting (two-step)	0	0	0	±	±	+	+	+	+	+	+
Parachute (protective extension of arms)	0	0	0	0	±	+	+	+	+	+	+
Landau (head up—back arched a bit in ventral suspension)	0	0	0	0	0	0	+	+	+	±	0

* Reflex grasp may still be present in sleep.

** Rooting and sucking may still be present when hungry or asleep.

In addition to the symbols for basic reflexes on each section of the bottom disc is a list of some of the major milestones of development at that age according to the Cattell Infant Intelligence Scale, Griffiths Mental Development Scale and the Composite Developmental Inventory. The last is a set of items designed by Caldwell and Drachman for appraisal of infants 1 month to 2 years of age, based upon selections from Gesell's Scales (*86*). Following are the developmental milestones noted on the wheel:

ONE MONTH:	Lifts head slightly from prone Head up momentarily when back supported

	Briefly watches and follows Avoids mildly annoying stimuli (cloth on face) May make some "noise in throat" sounds without definite form
TWO MONTHS:	Head erect, bobbing, when supported in sitting Follows moving person with eyes Imitates or responds to smiling person with occasional smile Vocalizes
THREE MONTHS:	Lifts head and chest when prone Vigorous body movement Better head control Recognizes bottle Coos, chuckles
FOUR MONTHS:	Good head control Rolls side to side Takes object (pencil) held near hand May begin reaching Follows moving object when held in sitting position Laughs aloud Enjoys play
SIX MONTHS:	Sits with minimal support on hard surface Rolls from supine to prone Volitional grasp with whole hand, transfers hand to hand and to mouth (reflex grasp may still be present in sleep) Reaches Babbles in more than two sounds*
NINE MONTHS:	Sits alone, can change position without falling Manipulates two objects simultaneously Says "mama," "baba"—consonant sounds* Unwraps cube
TWELVE MONTHS:	Stands, may step with support Pincer grasp, pellets in and out of cup, retrieves pellet under cup Stacks two blocks Hands toy on request

	Gives affection May say 2-3 words[*] Rooting and sucking may still be evident when hungry or asleep
FIFTEEN MONTHS:	Walks without support Stacks three blocks Jargons—voice up and down—pauses as in conversation[*] May use 4-5 words[*] Some self-feeding
EIGHTEEN MONTHS:	Walks, may run a bit, climb up and down a stair Likes pull toys, being read to Makes mark with crayon on paper or table Partially feeds self May be partially toilet-trained—daytime May use 5-10 words[*]
TWENTY-FOUR MONTHS:	Can throw, kick ball, open door, turn page Engages in parallel play Recognizes familiar picture, knows if it is upside down May use 2-3 word sentences[*] Improving daytime toilet training
THIRTY-SIX MONTHS:	Alternates feet on stairs Stands momentarily on one foot Rides tricycle Feeds self Puts on shoes Uses simple form board Knows own sex Daytime bowel and bladder control

Finally, on the back of the wheel are summarized the conditions or factors which can serve as "indexes of suspicion"—indications that referral to medical attention is warranted:

Overall lag in development of 3 months.

Basic reflex patterns: Lack of response; persistence or reappearance of response beyond normal range of variability; or abnormalities in the reflex patterns themselves, as outlined below:

Landau reflex: collapse into inverted U in ventral suspension.

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[*] Great variability in normal range of language development.

Parachute reflex: asymmetry of response or fisting of either hand.

Neck-righting: immediate and completely obligate trunk and pelvis rotation in response to turn of the head to the right, left, or on both sides.

Rooting and sucking: poor or asymmetric response.

Reciprocal kicking: asymmetric response.

Moro reflex: asymmetric response.

Asymmetrical tonic neck reflex: a completely obligate response to the right, left, or on both sides (i.e., the infant completely unable to "struggle out" of the posture, or a marked and very strong response on one side or the other).

Palmar grasp: asymmetric response.

Other factors:

Any major anomaly; three or more minor anomalies; change in vital signs; symptoms of acute illness; bulging or marked depression of fontanels; deviation of head circumference from normal curve; significant deviation in height or weight from normal range of variability for sex; marked extensor tone; opisthotonus; other abnormal posture; constant twitching; convulsion; excessive drowsiness; listlessness; marked hypotonia; high-pitched or very feeble cry; excess grunting; feeding problems; vomiting; persistent colic; hemorrhage, edema, bruises or other signs of trauma; deleterious environmental factors.

Developmental Screening Inventory

A very convenient instrument, "A Developmental Screening Inventory," has been devised by Dr. Hilda Knobloch (55) and her colleagues. By special permission of the senior author, the text and forms from this instrument are included in the appendix.

Such an inventory could prove a very valuable tool for the well-child conference, pediatric clinic and related activities of nurses. However, it is suggested that nurses receive careful preparation in the use of this testing procedure before it is included as an integral part of their nursing activity.

A similar instrument is the previously mentioned Composite Developmental Inventory prepared by Drs. Bettye M. Caldwell and Robert H. Drachman (*86*).

V

CASEFINDING AMONG OLDER CHILDREN

JUST AS SOME congenital disorders may not be recognizable until neurological organization proceeds to the extent that the child can be assessed for major milestones of motor development, other difficulties may not be recognized until the environmental challenges to intellect or the child's social and adaptive behavior becomes more structured, for instance, at the time the child is enrolled in school. It is possible that a child may proceed normally in his growth and developmental patterns and then deviate as a result of intercurrent illness (*87*) or trauma (*88*).

There are also the more subtle organic disorders which may be of congenital origin (*89*), such as the minimal brain damage syndrome (*90*). Children with this disorder are characteristically impulsive, unable to delay gratification, tend to sleep poorly, are irritable, and have a short attention span.

The perceptually handicapped child may not be able to perceive complete pictures or objects. For instance, when the nurse presents the child with a metal cup containing a toothbrush, the child may be so engrossed with the shiny cup that he literally cannot simultaneously see the toothbrush to which he is supposed to address his attention. A perceptually handicapped child may have intact auditory acuity but may not be able to react to pitch discrimination. Therefore, a sharp command in a potentially hazardous situation may convey no greater sense of urgency to him than a quiet request to pass the salt.

Slightly defective neuromotor organization (subclinical cerebral palsy) may be evidenced by clumsiness, including an apparent inability to handle any object with care. Consequently, the child who cannot "see" or "hear" or "take care of" things may be considered a mentally defective or a willfully stubborn and destructive individual until the true nature of his difficulty is suspected and he is referred for thorough professional evaluation. A Behavior Rating Scale which can be very useful to the nurse in sharpening her observations of children with these kinds of problems is published by the California Association for Neurologically Handicapped Children, P.O. Box 604, Los Angeles.

School nurses share considerable responsibility for casefinding, particularly among children of low-income families or those residing at a considerable distance from medical resources. When the nurse is consulted by the teacher about a child who is not doing so well in the classroom, she routinely assesses many factors, including general health and nutritional status. The school nurse is also able to visit the home and evaluate the home environment.

During a professional seminar held in San Francisco a few years ago, Dr. Meyer Perlstein, Professor of Pediatrics at the Cook County Graduate School of Medicine, outlined some broad screening techniques that can prove helpful in the nursing appraisal of children who are not doing well in school for one reason or another. He stated, for instance, that squint or cross-eye occurs quite frequently among children who have brain damage, and therefore, learning difficulties in the presence of this sign warrant careful and thorough evaluation for possible cerebral dysfunction, as well as for the overt visual difficulty. Dr. Perlstein also suggested that left-hand dominance should be evaluated—if none of the other family members are left-hand dominant (and it is important to note whether some may have been "changed over" earlier in life), it may be that the child's "left-handedness" is unique in this family and possibly due to a mild and heretofore undetected hemiplegia. In like manner, the child's shoes should be looked at to see if one toe is worn down more than the other. This could be a sign of foot drop, associated with hemiplegia or other disorder.

The possible presence of seizures, of which there are many types and subtypes, should be watched for with special care. Close observation and accurate reporting of seizure patterns by the school nurse can be of the greatest value to the physician in arriving at a diagnosis and plan of management since he is rarely present just at the time of a seizure.

All teachers and nurses can be expected to immediately recognize grand mal seizures. The petit mal type in which the child may have very short periods of inattention, with a fixed gaze, and does not respond for a few seconds (yet does not fall or obviously lose consciousness), is more easily missed. It is important to watch for other types which are not as common but still worthy of careful observation and report. For instance, a seizure may be manifested by chewing, swallowing, smacking, salivation, followed by a period of amnesia without loss of consciousness. Other types may be manifested by unusual visual, auditory or olfactory sensations. In the older child who is sitting at his school desk, a seizure may involve sudden forward flexion of the head or sudden loss of postural tone, which may look like a little bow.

This is sometimes called the salaam type seizure. It should be remembered that detailed recording of what the child actually does is infinitely more important than trying to attach a name to the manifestation.

It may well be difficult for a nurse to recognize some types of seizures which involve an organized behavior pattern. These seizures may resemble a temper tantrum, a sudden impulse to lash out, or other inappropriate or unexpected behavior. The child is not aware of what he is doing during these episodes.

Repeated attacks of abdominal pain could also be evidence of seizures. Of course, these can be easily missed or misinterpreted, since the youngster might be suspected of or known to have chronic appendicitis, inappropriate diet causing gastrointestinal problems, etc. Some psychosomatic explanation (wanting to withdraw from the classroom situation, or to miss a test, etc.) may be suspected, but the possibility of seizures in such cases should not be overlooked.

The teacher is of great potential help in casefinding. Teachers know their children and are sensitive to their individual characteristics. The school nurse (and of course the school physician, if there is one available) can greatly help the teachers to be alert for the more subtle as well as the overt signs of illness or dysfunction, possibly through an organized program of inservice training for teachers. Most nurses as well as regular classroom teachers have much to learn from the special educator or psychologist who has achieved a high level of sophistication in recognizing problems of dysfunction and assisting with appropriate programs of service for children with such problems. Where specialists are available, they should be involved in the inservice programs.

Observations by the teacher in the school playground can be very useful in casefinding. For instance, it may be noted there that a child always lags behind his peers in games, continuously "fumbles the ball," stumbles or is otherwise unusually clumsy. It may be noted that a child is never chosen by his colleagues to participate in games, is unusually withdrawn, unwilling or unable to participate in peer group situations, or is markedly aggressive in his relations with younger children.

In the classroom the teacher may be the first to notice and call to the nurse's attention a child of 8 or 9 years who is still unable to keep within the margins when attempting to draw a line between two converging ones, is unable to draw a diamond, or a square within a circle, which suggests problems with spatial relationships and form concepts. Such a child may well have problems with letters, learning to read, recognizing numbers and understanding numerical concepts, which make him appear to be mentally deficient. A thorough professional appraisal is warranted for these children, since such symptoms may be evidence of brain damage.

The importance of sensitivity of observation on the part of teachers, nurses, parents and others can be summed up in the following actual case.

A student nurse assigned to admit an 8-year-old boy to the pediatric ward in preparation for an adenoidectomy noted that the child had worn down the toe of his right shoe much more than the toe of his left. Later, observing him in the playroom, she noticed that he appeared quite clumsy in relation to other children of his age, and that he was left-hand dominant. She casually asked his mother about this when she returned to the ward to give the youngster some books and learned that he was the only "lefty" in the family and was always given a large napkin or towel at meals since he tended to spill things. In further observing the child, the nurse noted that he had a slight peculiarity of speech and was a bit awkward in the use of his right hand in managing buttons and eating. He also seemed quite shy, but the nurse felt this might very well be expected in the strange environment.

When the resident physician arrived on the ward to admit the child, the nurse shared her observations with him. During this hospital admission, the child was found to have cerebral palsy (hemiplegia), probably of congenital origin. The neuromuscular aspects were of no great significance, and he required no special orthopedic management. However, it was found that he was having a variety of problems, both at home and at school. He was not doing well in the classroom. Among his peers, he was constantly "it" when they played tag, as he could not run as well as the others. He was often rejected in games where sides were chosen, and now tended to voluntarily withdraw from any group. A review of his overall growth and development revealed that he had been somewhat slower than his siblings. Both his mother and teacher described him as a daydreamer who just wouldn't pay attention. The fact that the child had petit mal seizures and defective vision had also gone unrecognized until he was given a thorough appraisal during the hospital admission.

This youngster had never had consistent medical supervision. However, the family had been known to the visiting nurse association; the child had received his immunizations at the health department clinics; was known to the hospital outpatient department's ear, nose, and throat service for management of recurrent upper respiratory infections; had been seen once by a physician in his office for the suturing of a minor wound sustained in a fall from a swing; and once by a physician in the home when the child had a severe upper respiratory infection.

The fact that this child had undetected cerebral palsy for many years was of no orthopedic consequence, but the cumulative effect of his associated disabilities, which might have been prevented or alleviated, is self-evident.

For further information on casefinding among older children, see *Neurological Examination of Children* by Richmond Paine and Thomas Oppé, Wm. Heinemann Medical Books, Ltd., Surrey, England, 1966.

VI

SUMMARY

EARLY DISCHARGE OF INFANTS from the hospital following delivery has increased the responsibility of the nurse in assisting with earlier recognition of dysfunction and anomalies both before and after hospital discharge. Other factors in increasing this responsibility include the new knowledge about such abnormalities and how to look for them; the better preparation nurses are receiving in growth and development; and the generally expanded role of nurses today. This guide was prepared to help reinforce the basic knowledge and clinical experience nurses should have in order to effectively carry out their broadened function in casefinding. Numerous aspects of appraising the infant or child are reviewed, with special attention to the basic neurological reflex patterns and the maturation of the central nervous system. Criteria for determing whether an index of suspicion actually exists—whether medical assistance should be sought—are indicated for each segment of appraisal.

Protocols for assessing the condition and behavior of the infant or child are offered, including a procedure which can be carried out in the course of bathing the infant. Suggestions are given for discerning the more subtle, as well as the major, deviations from the normal.

While the emphasis here is on the infant and very young child, special suggestions are included to assist school nurses and teachers in the recognition of symptoms which may signal the presence of neurological or other disorders among children of school age.

A new "wheel" device, the Guide to Normal Milestones of Development, is included in this publication to provide a quick recall of the major milestones of development and focus attention upon the factors which may warrant referral to medical attention.

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Appendix A

SAMPLE BATH TECHNIQUE

Student nurses or other nurses may be interested in having a detailed description of a baby-bathing technique that lends itself particularly well to the bath-appraisal described in Chapter IV, "Procedures and Devices for Appraisal." Such a technique is the "bimanual" method, presented here as it might be used with an infant 4 weeks of age and after the umbilicus has healed. The basic steps and principles are the same whether carried out in the hospital or home, for a newborn or older child, and whether the cleansing agent is a lotion or soap.

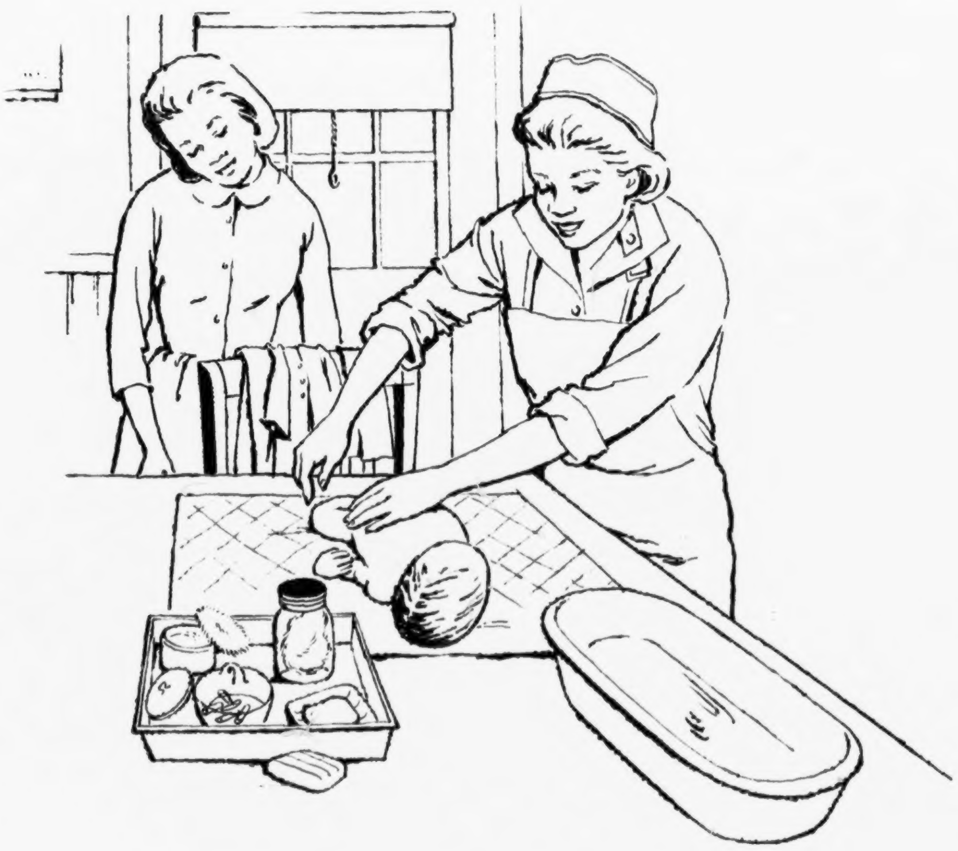
In brief, this bath technique consists of washing the face, using a facecloth and clear water, and shampooing the head, using soap lather on the nurse's hand, all before the infant is undressed. After he is undressed, lather is applied with the hand to the entire body; the baby is then immersed in the tub and rinsed.

Equipment and preparation

A bathinette can be used or, preferably, an infant tub on a kitchen table or other firm surface. A pad made up of a blanket covered by a diaper or a quilted bed pad may be placed on the table. In the minimal home situation, the nurse can easily make do with a washtub top and a scrubbed-out sink.

A kitchen chair is placed next to the table and used to hold the clean clothes (on the chair back) and the soiled clothing (on the chair seat which is covered by a newspaper).

A tray with a container of cotton, bath lotion or powder and baby soap should be placed on the table or tucked within easy reach in the bathinette pocket. A baby blanket is placed on the pad and covered by a diaper or baby towel. This way, the blanket can remain over the



Preparing for the bath

child while the towel is lifted to dry him.

A pad of cotton, clean soft rag, or infant washcloth is placed near the tub within easy reach.

At this point, the infant is checked while still in his bassinet to see if his diaper is wet or soiled by feces. If the diaper is soiled, the odor, consistency and color of the feces is noted. The nurse may proceed to take the rectal temperature now or wait until the child is undressed during the bath procedure. Preliminary observations of color, respiration, posture and tone are begun at this time and usually rechecked several times throughout the bath. If there are no contraindications to proceeding with the bath, the infant tub is filled and water temperature checked. The bath continues as follows (concomitant aspects of appraisal are outlined in Chapter IV):

Step one: The infant is placed supine on the table buttocks first, with the head permitted to extend a little in relation to his spine as he is lowered, permitting observation for the Moro reflex.

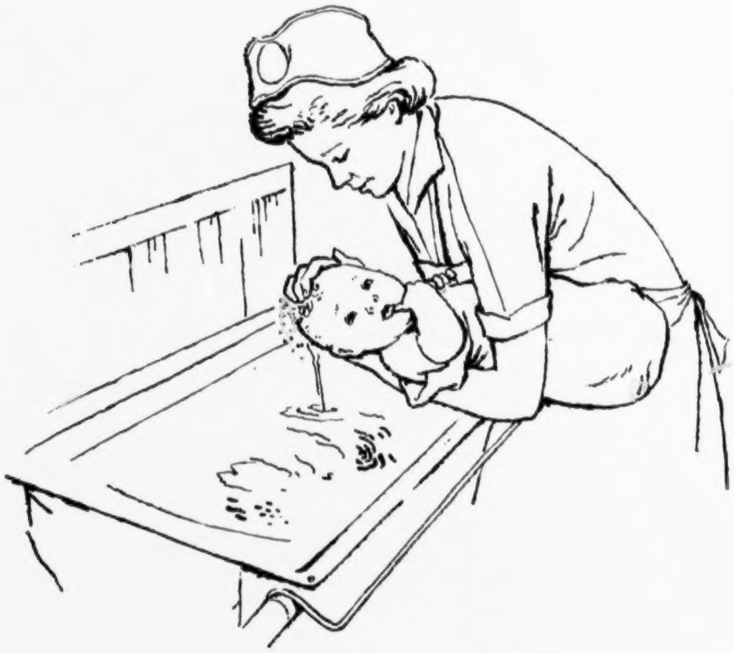
Step two: Washing the face. If the eyes show no redness or discharge, the nurse proceeds to wash the face with the washcloth wrung out in clear water.

If there is any discharge present in the eyes, the nurse will follow the dictates of the physician in charge, or the agency's standing orders for cleansing the eyes of infants who are not under the care of a private physician.

If any discharge is present in the nose, a cotton twist, dipped in water or baby oil and wrung very dry, may be used to cleanse the edges of the nostril.

Since the infant is still fully dressed, there is no reason to cover him. His arms and legs are thus free to move while the nurse passively rotates the head to the left and right to wash the external ears.

The infant's face and ears are then dried.



Shampoo

Step three: The shampoo. Wrapping the still dressed infant in the blanket covered by the diaper or bath towel, the nurse places him under her arm in supine position, tucking him against her hip, supporting the shoulders and neck with the hand, and placing herself so that the infant's head is held above the baby tub.

If the bathinette is being used, the nurse picks up the infant in the manner described above and steps back, raising the lid of the bathinette with her free hand or the foot pedal if the bathinette is thus equipped, and then approaches so that the infant's head is over the tub. Dipping her free hand in the water, she revolves the soap in her palm and applies the lather to the infant's head.

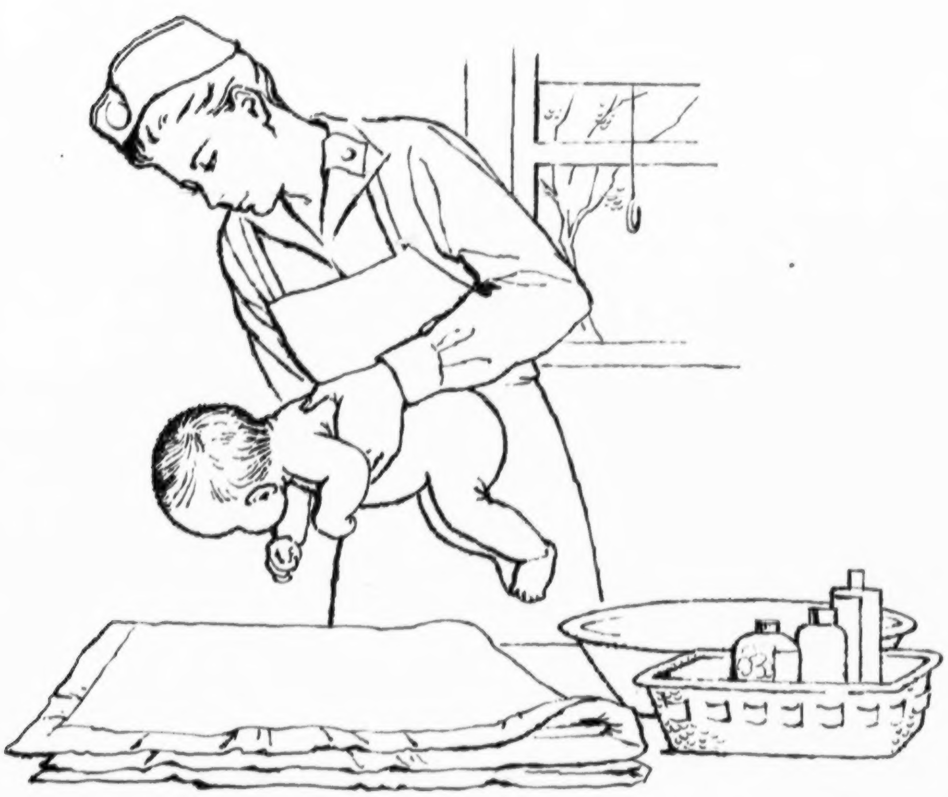
The head is rinsed by cupping clear water in the hand and letting it flow gently over the head.

The infant is then replaced on the bath pad and the head gently dried. If a bathinette is used, the nurse steps back, replaces the cover, and then steps forward to place the infant back on the bathinette surface.

Step four: The infant is undressed and lightly covered by the bath blanket and towel.

Step five: The nurse dips both hands in the tub of water. (When using a bathinette, the hands can be inserted into either or both ends of the tub below to wet them without again moving the infant from the bathinette top.) Again the soap is picked up and lather made between the palms.

Checking posture in ventral suspension



Proceeding quickly and using both hands simultaneously, soap is applied to the trunk, arms and legs, hands and feet while the child is still in supine.

Step six: Placing her hands under the infant, the nurse lifts and holds him in ventral suspension a moment, then lowers him into the prone position, and applies soap with the hands to the back.

Step seven: To turn the infant back into the supine position, one arm is placed under the shoulders, supporting the neck and head, and the hand extended under the distal arm, clasping it firmly with the finger and thumb.

The nurse then places her other hand under the legs, inserting the forefinger between the ankles and grasping them firmly. The infant is then gently lifted and lowered into the tub, the arm under neck and shoulders maintaining its firm grasp. The legs are then released, permitting the infant to kick, while the nurse uses her free hand to gently cup water over the infant's body, thoroughly rinsing him.

The bath water is still clear since a soapy washcloth has not constantly been dipped in and out of the tub.

The nurse using a bathinette can clasp the child in the above manner, step back to raise the lid with the foot pedal or elbow, then place the child in the tub. Bathinettes with inclined inserts permit the infant to kick and generally wiggle about more freely, since he need not be so securely supported by the nurse's arm while in the tub.

Step eight: Following a short period of play, which even small infants seem to enjoy, and while carefully checking color and generally being alert for any possible chilling, the infant is lifted from the tub employing the same grasp used to place him in it. He is then quickly wrapped in the bath blanket-towel combination. However, at this point, the towel, rather than the blanket, is placed next to the infant, and he is gently dried, again using both hands simultaneously during at least part of the drying process.

Whether a bit of lotion or powder is applied in the creases depends upon the standing orders. If either is used, the nurse is advised to place the fluid or powder on her fingers first, then apply it to the infant, again using both hands simultaneously.

Step nine: The infant is dressed and returned to his crib.

Appendix B

UNIVERSITY OF COLORADO MEDICAL CENTER PREMATURE INFANT NURSERY CHECKLIST[1]

Birth Wt.__________Gms.

Birth Date__________

Date:
Ward:

Name:
Hospital No.:
Address:

Symptoms of Illness

Date																				
Time																				
Gavaged poorly																				
Sucked poorly																				
Gagged																				
Drooled																				
Regurgitated																				
Hiccoughs																				
Mucus																				
Abdominal distention																				
Abnormal stools																				
Sore buttocks																				
Weight loss																				
Convulsions																				
Rigid																				
Opisthotonus																				
Twitching																				
Irritable																				
Hyperactive																				
Less active																				
Lethargic																				
Weak cry																				
Shrill cry																				
Moro, poor or absent																				
Moro, exaggerated																				
Moro, asymmetrical																				
Rapid pulse																				
Slow pulse																				
Irregular pulse																				
Petechiae																				
Bruises																				
Bleeding (specify area)																				
Respiratory rate																				
Shallow respirations																				
Deep respirations																				
Irregular respirations																				
Labored respirations																				
Grunting respirations																				
Abnormal respirations																				
Retractions																				
Apnea																				
Cough																				
Sneeze																				
Stuffy nose																				

* mild a = ac
** moderate p = pc
*** severe r = rest

---

[1] Developed by L. Lubchenco and E. Ott.

Appendix B

(continued)

Birth Wt._________Gms.

Birth Date_________

Date:
Ward:

Name:
Hospital No.:
Address:

Symptoms of Illness

Date																			
Time																			
Cyanosis, circumoral																			
Cyanosis, ocular																			
Cyanosis, extremities																			
Cyanosis, generalized																			
Cyanosis, intermittent																			
Cyanosis, constant																			
Pallor																			
Plethora																			
Mottled																			
Harlequin syndrome																			
Jaundice																			
Edema, generalized																			
Edema, extremities																			
Edema, eyelids																			
Sclerema																			
Dehydrated																			
Bulging fontanel																			
Sunken fontanel																			
Temp. above 37°																			
Temp. varied 2° or more																			
Body cold to touch																			
Incubator temperature																			
Umbilicus red																			
Umbilicus oozing																			
Skin irritated or excoriated (specify area)																			
Pustular rash																			
Skin dry or peeling																			
Breast abscess																			
Other																			
Gavaged well																			
Hungry																			
Sucks well																			
Resisted gavage																			
Weight gain																			
Strong cry																			
Active																			
Regular pulse																			
Regular respiration																			
Color stable																			

* mild a = ac
** moderate p = pc
*** severe r = rest

Appendix C

MAJOR AND MINOR ANOMALIES

Major Anomalies *

CENTRAL NERVOUS SYSTEM

Hypotonicity
Hydrocephalus
Anencephaly
Microcephaly, severe
Marked hypertonicity
Meningocele

CRANIOFACIAL

Micrognathia, severe
Defect bony orbits
Choanal atresia
Scaphocephaly, severe
Hypertelorism, severe
Protruding forehead
Beaklike nose
Absent ramus of mandible
Defect of malar bone

EYE

Cataract or corneal opacity
Coloboma of iris
Microphthalmos, severe

AURICLE

Low-set, severe
Severely malformed
Rudimentary
Low ear canal

ORAL AND GASTROINTESTINAL TRACT

Cleft lip and cleft palate
Cleft palate alone
Cleft lip alone
Imperforate anus
Intestinal atresia

SKIN

Webbed neck (posterior)
Multiple hemangiomas

HAND

Severe flexion of fingers
Short hands
Polydactyly
Complete cutaneous syndactyly
Absence of thumbs
Index finger overlapping 3rd
Absence of all metacarpals
Absence of distal phalanx
Ulnar deviation of hand
Broad fingers
Streeter's bands and deformity

FOOT

Calcaneovalgus, severe
Equinovarus
Syndactyly, cutaneous
Absence of nails
Rudimentary distal phalanx
Streeter's bands of ankle and toes
Dislocation at ankle
Metatarsus adductus, severe

OTHER SKELETAL

Congenital dislocated hip
Short neck, severe
Absence of radius
Absence of fibula
Short thoracic cage
Malleable bones

GENITOURINARY

Severe hypospadias
Common cloaca

MISCELLANEOUS

Sacral teratoma
Gastroschisis
Absence of sternocleidomastoid muscle

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* Defined as one which has adverse effect either on function or social acceptance. Detected by surface examination of 4,412 newborns.

Source: P. N. Marden, D. W. Smith, and M. J. McDonald, "Congenital Anomalies of the Newborn," Journal of Pediatrics 64:363, 1964.

Appendix C

(continued)

Minor Anomalies *

CRANIOFACIAL

Borderline small mandible
Prominent occiput
Flat occiput
Large posterior fontanel
Small nares

EYES

Bilateral inner epicanthal folds
Upward lateral slant of palpebral fissures
Short palpebral fissures
Short inner canthal distance
Downward lateral slant of palpebral fissures
Sparse eyebrows
Web of connective tissue across eyelids

AURICLE

Lack of usual fold of helix
Preauricular and/or auricular skin tags
Severe slant away from eye
Asymmetrical size
Small
Absent tragus
Separate lobule

SKIN

Capillary hemangioma elsewhere than face or posterior of neck
Low hairline posteriorly
Alopecia of scalp, spotty
High placed nipples

HAND

Simian crease
Other unusual crease pattern
Clinodactyly of 5th finger
Clinodactyly of other fingers
Narrow hyperconvex fingernails
Long narrow fingers
Single crease on fingers
Rudimentary polydactyly

FOOT

Prominent calcaneous
Dorsal flexion of hallux

OTHER SKELETAL

Cubitus valgus

MISCELLANEOUS

Diastasis recti

---

* Defined as one with no adverse medical or cosmetic consequence. Detected by surface examination of 90 babies having one or more major anomalies.

Source: P. N. Marden, D. W. Smith, and M. J. McDonald, "Congenital Anomalies of the Newborn," Journal of Pediatrics 64:363, 1964.

Appendix D

A DEVELOPMENTAL SCREENING INVENTORY

(4 weeks to 18 months)

By Hilda Knobloch, M.D., Benjamin Pasamanick, M.D., Earl S. Sherard, Jr., M.D., Division of Child Development of the Department of Pediatrics and the Department of Psychiatry, Ohio State University College of Medicine, and the Children's Hospital, Columbus, Ohio.

GENERAL INSTRUCTIONS:

Development proceeds in an orderly predictable manner, with the same variability in behavior for normal infants found in all biologic measurements. By asking some questions of parents, observing the infant's behavior and recording this information systematically, an estimate of the level of function in various areas of behavior can be made which correlates very highly with the maturity age assigned on the basis of a complete Gesell Developmental and Neurologic Examination*, from which the items are adapted.

This screening inventory will be of value for serial observations in well-baby supervision as well as for diagnostic problems referred for evaluation. READ THE ENTIRE INVENTORY BEFORE ATTEMPTING TO USE IT.

DO NOT BE ALARMED BY THE LARGE NUMBER OF QUESTIONS. They cover the age range from 1 to 18 months and any *one* infant can *usually* be evaluated by 2 or 3 consecutive age levels at most. We have tried to phrase the items as clearly as possible; specific explanations for some are listed in the instructions. It will help to understand them if you *look at the adjacent age levels,* e.g., *lift* vs. *hold* at 8 and 12 weeks in Gross Motor Behavior; offer the parents both alternatives. ASK THE QUESTIONS AS THEY ARE STATED.

START by asking questions appropriate to the chronologic age of the child. If the answers are negative, drop to a lower age level then work back up. It is best to cover ONE AREA OF BEHAVIOR AT A TIME rather than one age level at a time. *Remember that the infant may be slow in one area and normal in other areas.* Keep asking questions above the child's chronologic age until no more positive answers are obtained. When you start your interview TELL THE PARENTS SOME QUESTIONS ASKED WILL BE ABOVE THE CHILD'S LEVEL OF ABILITIES.

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* Gesell, A. L. and Amatruda, C. S.: Developmental Diagnosis, Hoeber. 1954, New York.

Record the parents' answers [H=History Col.] and your observations [O=Observed Col.] on each visit, to the left of each item. For behavior which depends on your observations only, the history column is blocked out. Record responses + [Present], — [Absent], or × [Unknown]. If an infant is seen every 4 weeks there may be some overlap in behavior; confusion can be avoided by recording in different colors. Failure to progress normally will be obvious if significant overlap between visits persists.

Blocks are provided for recording the age level at which the child is functioning and the diagnoses. In each of the five areas of behavior, assign maturity levels in weeks, or months, based on your clinical judgment of the age levels your recorded history and observations describe best. You can interpolate between the adjacent age columns, e.g., 35 weeks, since a 32 week infant adds 36 weeks behavior gradually over the next 4 weeks. DO NOT FORGET TO TAKE THE PARENTS' HISTORY INTO ACCOUNT. This is particularly true in language behavior, which may not be exhibited during the examination. We have found parents' reports to be very accurate when clear-cut specific questions are asked.

Assign a diagnostic category in each area on the basis of your age levels. With just these items, expect to be able to divide the infants into three diagnostic categories: [A] definitely abnormal, [Q] borderline or questionably abnormal, and [N] normal, or advanced. Do not expect to make a precise diagnosis. REMEMBER THAT THERE IS NORMAL VARIATION AROUND THE AVERAGE OF 100 AND THAT THE AGE PLACEMENT OF AN ITEM IS THAT AT WHICH ROUGHLY 50% OF INFANTS ACHIEVE SUCCESS. If an infant has a history of normal language behavior, at least at 36 weeks and beyond, it is dangerous to make a diagnosis of mental deficiency, even though adaptive behavior is retarded. Be suspicious of the presence of abortive grand mal convulsive seizures.

Age in weeks must be *counted on the calendar;* there are 13 4-week periods per year. Don't forget to SUBTRACT THE WEEKS OF PREMATURITY from the chronological age.

CONDUCT OF THE EXAMINATION:

Test Objects:

In the actual examination the test objects are very specific, but they can be approximated and should consist of the following, which can be purchased in most supermarkets:

a round embroidery hoop 4″ in diameter with a string about 8″ long no more than 1/16″ diameter

an aluminum cup 3.5″ in diameter

a plastic bottle in use in most pharmacies, 2″ high and 1″ in diameter

round cinnamon candies used in cake decoration [for the 8 mm. pellet, or "crumb"]

a child's picture book

a large crayon and paper

10—1″ wooden cubes; the surface should not be embossed with designs.

"Small toy" usually refers to the 1″ cube, but the plastic bottle also qualifies and is more appropriate at 40–48 weeks in connection with the crumb [pellet].

Even these objects are not essential. On the hospital wards tongue blades, a stethoscope, or a small flashlight can be used early; the small paper medicine cups or the pop-apart plastic beads or other toys that the infants frequently have can substitute for the cubes. For the pellet [crumb] a piece of paper rolled into a *small* ball is fine. The tape used to tie toys across the cribs is rather large but it can substitute for string. At the older ages some child on the ward usually has a book, and a medicine glass can be used for a bottle. A large notebook or a file folder can serve as a table if no tray is handy. The mother, or a nurse or attendant, can support the young infant in a sitting position.

General Comments on Conducting the Examination:

Note that at the age of 20 weeks and below the Adaptive Behavior items are observed when the baby is *lying on his back* in *supine*. At 24 weeks and over he is expected to do similar things in a *sitting* position; initially he will need to be held supported or tied into a high chair so that his hands will be free to manipulate the test objects. ALL INFANTS SHOULD BE EVALUATED IN SUPINE, SITTING, PRONE, AND STANDING, except that above 32 weeks a normal infant need not be placed on his back. Start in the supine position routinely up to 20 weeks of age and up to 32 weeks if the infant happens to be in that position; after 32 weeks start the examination in sitting. If a younger infant happens to be in his mother's lap, he may not want to lie down and the examination can be started in sitting.

The infant must cooperate if information useful in assessing behavior is to be obtained, and his degree of cooperation is often directly related to the manner of the examiner. If you talk to the infant before and during the examination in a friendly manner and do not push him to perform, good rapport is usually established. The examination is often more successful if it does not follow immediately some painful or upsetting procedure you have performed, but even in such situations presenting the toys will usually secure his cooperation. OFFER SOME TOY OTHER THAN A TEST OBJECT BEFORE HANDLING THE INFANT. WHEN HE TAKES IT HE USUALLY HAS ACCEPTED YOU AND WILL LET YOU PICK HIM UP.

Presentation of Test Objects:

Supine—start with the object in the midline at the infant's feet and bring it up toward eye level. Hold it about 15–20″ from the infant for visual responses and within reach if he is mature enough to grasp.

Sitting—tap the object at the edge of the table in the midline with clear up and down motions of the arm. When the infant has fixated on the object slide it *within reach* with a smooth horizontal motion; do not jerk your arm up and down on the way in. When presenting ring and string, put string down in reach, tap *ring* up and down and put ring on table, but out of reach.

MOST BEHAVIOR IN INFANCY IS SEEN DURING SPONTANEOUS PLAY AND NOT ELICITED ON COMMAND. Present one cube, then the second, add the third, add the rest of the cubes and then the cup and observe what he does. ALWAYS GIVE THE INFANT AN OPPORTUNITY FOR SHOWING THE MOST ADVANCED BEHAVIOR FIRST: e.g., spontaneous behavior when given an object; verbal request and/or pointing before demonstration, as in putting cube into cup; reach and grasp before visual following or placing in the hand, at younger ages.

REMOVE THE OBJECT[S] at the end of each situation or group of related situations before presenting the next one, but HAVE THE NEXT OBJECT READY before trying to take away what the infant is holding. IF HE OBJECTS STRONGLY, PRESENT THE NEXT ONE BEFORE TRYING FURTHER. This procedure usually works. DO NOT USE FORCE.

Talk to the infant or, better, describe what he is doing while you are doing the examination.

SPECIFIC BEHAVIOR PATTERNS:

Postures Lying on Back in Supine:

4 weeks: *asymmetrical* or tonic-neck-reflex [TNR]—the fencing stance with head turned to side, arm and leg extended on that same side, other hand fisted at occiput.

16 weeks: *symmetrical*—head usually in midline or freely movable,

arms both either in at chest or out.

12 weeks: head more apt to be asymmetric than body.

Head Control in Sitting: [Needs full trunk support]

4 weeks: head sags against the chest once it is brought forward.

8 weeks: it sags but can bob to an erect position.

12 weeks: head set forward between hunched shoulders; infant looks ahead, but head bobs down at times.

16 weeks: still hunched; does not bob forward unless turned away to side.

20 weeks: head is in line with the upper trunk, no longer hunched, and no bobbing.

Pivot: to move about in a circle in one spot.

32 weeks: infant does this lying on his abdomen by crossing one arm over the other.

Sitting:

28 weeks +: must be done on *hard surface,* not bed.

40 weeks: *goes* to prone—controlled, not falling; straight over, *not* to side first. Must be able to sit steadily before he can do this.

Grasp: reach out and take promptly in one motion; differs from approach with eventual prehension. Progresses from ulnar side of hand to radial digits.

12 weeks: *hold an object actively;* obvious if he lifts it off bed. Otherwise knuckles whiten, which they do not do if toy rests passively in his hands.

20 weeks: can't reach out and pick up toy but shows he is trying by *scratching at the table when he sees it.* May scratch without toy being present.

Small toy [cube] grasp:

24 weeks: has whole hand palmar grasp and all fingers press toy against center of palm.

28 weeks: is still in the palm, but is held at the radial side, primarily by the index and third fingers and is pressed against the thumb too.

36 weeks: there is a space between toy and palm and it is held with thumb and ends of index and third.

"Crumb" [pellet] grasp:

28 weeks: can pick up small toy but not crumb-sized object—can only land on this with his whole hand or try to get it with raking movement of whole arm.

Grasp of small objects then proceeds in same way as grasp of larger objects—towards the radial digits, with suppression of movements of whole arm and hand.

40 weeks: Pluck—grasp promptly between *ventral* surfaces of thumb and index finger.

Miscellaneous:

40 weeks: Put toy down—controlled removal of hand from object, not just dropping.

40 & 44 weeks: plays with cube in, or removes from cup, *when the rest are left beside it* [may have to take a cube from his hand if he is holding two].

18 months: pulls toy on string after himself as walks or crawls around; not just pulling it towards himself.

Language:

4 weeks: sounds are made but have no definite form—are just noises in the throat.

36 weeks: he puts consonant sounds together without meaning: da-da, ba-ba.

A "word": a sound used consistently to mean something—a person, an object, a group of objects.

A nursery trick: wave "bye-bye," play "pat-a-cake," "peek-a-boo," "so-big," etc.

15 months: "talking" a foreign language is "jargoning," i.e., making voice go up and down, pausing as though at end of a phrase, etc., in conversation, and expecting you to understand what he is saying. It is not "just baby babbling."

DEVELOPMENTAL SCREENING INVENTORY

Patient's Name: ______________________

Birth Date: ______________________

Birth Weight: ______________________

E.D.C.: ______________________

Age [Weeks]: ______________________

Student: ______________________

Date: ______________________

Ask Mother after Interview:

What age baby do you think your baby is acting like?

____

KEY AGES

H=History; O=Observation

4 WEEKS
ASYMMETRIC TONIC-NECK-REFLEX

	H	O	
ADAPTIVE	▨		Regard toy only when it is brought in front of eyes
			Can follow dangled toy only to midline, not past it
			Drop toy put in hand at once
GROSS MOTOR	▨		Head sag forward if held *sitting*
	▨		Asymmetric tonic-neck-reflex postures predominate
			Clear nose from bed in prone
FINE MOTOR			Both hands held tightly fisted
	▨		Hand clench as toy touched to it
LANGUAGE	▨		Impassive face
	▨		Vague indirect regard
			Make small throaty noises
PERSONAL SOCIAL	▨		Regard examiner's face and decrease activity
	▨		Indefinite stare at surroundings

8 WEEKS

	H	O	
ADAPTIVE	▨		Delayed regard of toy you hold in midline over chest
			Follow dangled toy past midline
			Retain briefly toy put in hand
GROSS MOTOR	▨		Head bob erect if held *sitting*
			No head droop if suspended prone
			Lift head to 45° in prone [on abdomen] recurrently
FINE MOTOR			------------------
LANGUAGE	▨		Alert expression
	▨		Direct definite regard
			Make single vowels—"ah, eh, uh"
PERSONAL SOCIAL			Smile back just if you nod head and talk to him
			Eyes follow moving person around

12 WEEKS

	H	O	
ADAPTIVE	▨		Prompt regard of toy dangled in midline at chest level
	▨		Follow toy, or Ex's hand, in 180° continuous arc, side to side
			Glance at toy when put into hand
GROSS MOTOR	▨		Head bob forward if held *sitting*
	▨		Symmetric posture head, body seen
			Hold head up 45° when in prone [on abdomen] sustainedly
FINE MOTOR			Hold hands open or close loosely
	▨		Hold toy put in hand with active grasp
LANGUAGE			Coo and chuckle
			"Talk" back just if you nod head and talk to him
PERSONAL SOCIAL	▨		Look at examiner predominantly
			Hold up and look at own hand
			Pull at clothes

16 WEEKS—SUPINE

	H	O	
ADAPTIVE			Wave arms, move body at sight of toy; dangled if on back, or put on table if held in sitting
			Regard [look at] toy in hand
			Take toy to mouth when on back
GROSS MOTOR			Head steady, set forward, *sitting*
	▨		Symmetric postures predominate
			Hold head 90°, look directly ahead in prone [on abdomen]
FINE MOTOR			Scratch, finger, clutch at clothes
			Bring hands together in midline and play with own fingers
LANGUAGE			Laugh out loud
	▨		Excite, breathe heavily, in play
PERSONAL SOCIAL			Initiate smile just when people come up and stand beside him
			Recognize bottle just on sight

20 WEEKS

	H	O	
ADAPTIVE			Bring both hands up towards toy, on back or if supported sitting
			Grasp toy only if held near hand [approx. one inch away]
			Look after toy dropped in sight
GROSS MOTOR	▨		Head erect, steady, held *sitting*
	▨		No head lag when held by hands and pulled to sitting
			Push whole chest off bed, prone
FINE MOTOR	▨		Scratch on tabletop, or on bed in prone [toy in sight not essential]
LANGUAGE			Squeal like a little pig, voice up high
PERSONAL SOCIAL			Smile at self if *close* to mirror
			Put both hands on bottle when feeding

KEY AGES

H = History; O = Observation

	H	O	24 WEEKS	H	O	28 WEEKS ONE HAND APPROACH & GRASP	H	O	32 WEEKS
ADAPTIVE			Reach & pick up or take toy with both hands			Reach & pick up or take toy with one hand only			Pick up one small toy and then second one
			Reach for toy dropped within reach			Transfer toy easily, hand to hand			Hold these two prolongedly
			Put toy in mouth when held supported in *sitting*			Bang toy up and down when *sitting* supported	▨		Secure toy by string if string contacted by hand
GROSS MOTOR			Grasp foot when lying on back [in supine]			Lift head from bed if on back			Sit 1 minute erect unsteady on *hard surface*
			Roll to abdomen, get both arms out from under chest			Sit if put on *hard surface* leaning on hands			Stand, hands held shoulder height
						Stand if chest held under arms			Pivot in circle, prone, using arms
FINE MOTOR			Pick up small toy and hold in center of palm with all fingers	▨		Pick up small toy, hold to radial side palm with 2nd & 3rd finger			Try to pick up crumb by raking with thumb, 2nd & 3rd fingers, usually little arm movement
						Put whole hand on crumb, rake it			
LANGUAGE			Grunt and growl [deep sounds]			Say "Mum-mum-mum" esp. crying			Make single consonant sounds, "da, ba, ga, ka"
			Initiate "conversation" with toys or people			Make same vowel sound in series: "ah-ah-ah, uh-uh-uh, oh-oh-oh"			
PERSONAL SOCIAL			Know strangers from family			Feet to mouth when lying on back			Bite & chew toys, not just lick
			Smile and talk to self if put *close* to mirror			Reach out & pat self if put *close* to mirror			Persist in reaching for toys out of reach

	H	O	36 WEEKS	H	O	40 WEEKS PICKS UP CRUMBS & THREADS	H	O	44 WEEKS
ADAPTIVE	▨		Drop one of two toys picked up to take third one offered			Play inside cup with toy you put there, touch & manipulate it			Take toy out of box or cup
			Hit toy in hand at toy on table			Hold small toy & try to or pick up crumb at same time			Put small toy inside cup or box if shown, but not let go of it
			Hold toy in one hand & play with attached string with other			Poke with index finger at things	▨		Poke at crumb inside bottle
GROSS MOTOR			Sit 10 plus minutes steady on *hard surface*			Sit erect & steady indefinitely			Stand at furniture without leaning against it, lift one foot up and down
			Stand at furniture & not lean against it if put there			*Go*, not fall, forward to prone			
						Crawl [creep] on hands & knees			
						Pull self to standing			
FINE MOTOR			Pick up small toy in ends of fingers			Put small toy down, take hands off			------------------
			Pick up crumb, thumb & index finger	▨		Pluck crumb up promptly, usually with thumb and index finger			
LANGUAGE			Say da-da, ba-ba, without meaning			Say and mean "ma-ma" and "da-da"			------------------
			Imitate cough, tongue click, etc.			Have one other "word"			
			Know own name			Play nursery trick just if asked			
PERSONAL SOCIAL			Hold own bottle, pick up if dropped and finish it			Play nursery trick only if you do it first; doesn't understand meaning of words [does above]			Hold out toy to you, but not let go of it
			Feed self cracker, do good job						Reach for image of toy in mirror

KEY AGES

H=History; O=Observation

48 WEEKS

	H	O	
ADAPTIVE			Play with one toy after another of a group in same way, in sequence [e.g., drop to floor, move to another spot on table]
	▨		Exploit crumb only, ignore bottle
GROSS MOTOR			Hold furniture & walk around it
			Walk if both hands held at shoulder height for balance
FINE MOTOR	▨		Pluck crumb easily with thumb & index finger, not resting arm or hand on tabletop
LANGUAGE			------------------
PERSONAL SOCIAL			Take toys off table to another surface [e.g., floor] deliberately in play

52 WEEKS
TRIES TO PILE OBJECTS

	H	O	
ADAPTIVE			Try piling one small toy on 2nd just presses or it falls off
			Put toy in cup or box if you show him first each time
			Dangle toy by string, deliberate
GROSS MOTOR			Walk with only one hand held
FINE MOTOR			------------------
LANGUAGE			Say 2 "words" plus ma-ma & da-da
			Let go of toy into your hand if you hold hand out for it
PERSONAL SOCIAL			Help in dressing—push arm thru sleeve if you get it started
			Offer toy to own mirror image

56 WEEKS

	H	O	
ADAPTIVE	▨		Put toy into cup or box just if you point and ask him to
			Imitate scribble with crayon after you do it
GROSS MOTOR			Forget to hold on, stand alone momentarily
			If standing up, take few steps alone, fall headlong
FINE MOTOR	▨		Pick up two small toys in one hand at same time, deliberately
LANGUAGE			Say 3 or 4 "words"
			When asked to, look at object: ball, shoe, light, T-V set, etc.
PERSONAL SOCIAL			Use slight casting motion and play ball *with* you, throwing it towards you

15 MONTHS

	H	O	
ADAPTIVE			Pile 1 small toy on 2nd [tower 2]
			Get 5-6 [of 10] small toys in cup or box; doesn't put all 10 in
	▨		Stroke crayon *in air* imitatively after you draw vertical stroke
GROSS MOTOR			No longer creep or crawl
			Get up in middle of floor and walk alone
			Collapse & catch self when falls
FINE MOTOR			Drop crumb into bottle just if you point and ask him to
			Help turn pages of book
LANGUAGE			4-6 words, including first names
			"Talk" foreign language—jargon
			Pat at pictures in book
PERSONAL SOCIAL			Indicate wants by pointing or vocalizing [grunt, "uh-uh-uh"]
			When fed leaves dish on tray

18 MONTHS
LOOK SELECTIVELY, IDENTIFY PICTURES

	H	O	
ADAPTIVE			Dump crumb out of bottle—may show
			Scribble when you hand him crayon, i.e., spontaneously
	▨		Imitate stroke *on paper* after you draw vertical stroke
GROSS MOTOR			Run stiff-legged
			Rarely fall when walking
			Climb into adult chair
			Walk upstairs if you hold 1 hand
FINE MOTOR			Turn pages of book 2-3 at once
			Stack up 3 small toys [tower 3]
LANGUAGE			Point to picture, if ask: dog, baby
			Look back & forth as you point from 1 picture to other in book
PERSONAL SOCIAL			Walk or crawl, pulling string toy
			Hug and love doll, stuffed animal
			Use spoon to feed, spill good bit

Record MATURITY LEVEL in weeks, or months, and the DIAGNOSTIC CATEGORY. [Can assign intermediate level, e.g., 35 weeks]

N=Normal, or advanced
Q=Questionable
A=Abnormal

	MATURITY LEVEL	DIAGNOSTIC CATEGORY
Adaptive	________	________
Gr. Motor	________	________
Fine Motor	________	________
Language	________	________
Pers-Soc.	________	________

Examiner's Name: ____________________

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